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AMERICAN RAILROAD JOURNAL, MECHANICS' MAGAZINE.

VOL. VII.—NEW SERIES.—No. 4. VOL. I.

CONTENTS:

NEW-YORK:
PUBLISHED BY THE EDITORS AND PROPRIETORS,
D. K. MINOR, & G. C. SCHAEFFER, 120 NASSAU-ST.,
(*Up Stairs.*)

Aug. 15 1838.

☞ It is to be distinctly understood, *that for the period from January to July of the current year*, 1838, no numbers of the Journal will be issued; and that the volume will commence with 1st *July*, 1838.

*** POST MASTERS are respectfully requested, in case a subscriber has removed from the place, or does not call for the Journal, to return the numbers, and inform *to what place he has removed*, or the reasons assigned for not taking the numbers out of the office.

N. B. *Two* Sheets—postage *three cents* for any distance under, and *five* for any distance *over* 100 miles.

PRINTED BY G. MITCHELL, 265 BOWERY.

CIRCULAR.

Fourth Annual Fair of the Mechanics' Institute of the City of New York.

The Fair of the Institute will be held at Castle Garden, commencing Monday, September 3d, 1838.

That this exhibition may be rendered worthy of the arts, and of the ingenuity of the American people, the managers appointed to conduct the approaching Fair, have determined to make such liberal arrangements as will insure to the contributors a fair opportunity of exhibiting their productions to the greatest advantage.

The object of Exhibition Fairs is to present to the members of the institute, and their fellow citizens, who are engaged in the mechanic and fine arts, and in manufactures, the means of making their skill and ingenuity known in a way which no other facilities afford: the many thousands who visit such exhibitions have a much better opportunity of judging of the merits of the various productions, than they would have by a mere verbal or newspaper description, besides the advantage of seeing brought together in one vast collection, the products of the skill, ingenuity, and industry of our country.

PREMIUMS of medals, diplomas, &c. will be awarded for ALL worthy or meritorious articles exhibited, either as it respects superior workmanship, machinery wherein the operations are new, interesting or important, where ingenuity is displayed, or taste manifested, and particularly for all new and useful inventions.

You are respectfully requested to send, for competition or exhibition, specimens of the articles you manufacture; and you may be assured that the strictest impartiality will be observed in the distribution of the premiums.

Appropriate arrangements will also be made for the exhibition of specimens of workmanship in the fine arts, and competent judges will be appointed for their examination.

Steam power will be provided for the accommodation of those who wish to exhibit machinery in operation; an experienced superintendent will take charge of this department, and contributors in this branch are particularly invited to send or bring their machines or models as early as possible, on the 1st September, that the necessary arrangements may be made in relation to shafting, pullies, &c.

In addition to the former method of conducting the fairs of this institute, places will be appropriated for the sale of light or fancy articles; which may be secured on application at the institute rooms, City Hall, where any information relating to the fair may also be obtained.

O. WHITTLESY, *Chairman*,
JOHN HAROLD, *Secretary*, } *Board of Managers.*

N. B. All articles for competition must be delivered to the committee, at Castle Garden, on the 1st September. Those for exhibition only will be received any day during the fair, before 10 o'clock A. M.

NEW YORK, June 13th, 1838.

RULES AND REGULATIONS.

1. The garden will be opened for the reception of goods, on Saturday, 1st of September, from 6 o'clock, A. M. until 9 o'clock, P. M., and it is respectfully urged that all articles intended for competition may be sent in early in the day. Those articles intended for exhibition only will be received any day during the fair, before the hour of 10, A. M.

2. The fair will open for visitors on Monday, 3d September, at 10 o'clock A. M. and continue open every day of the exhibition till 10 o'clock, P. M.

3. Competent and impartial judges will be appointed to examine all articles presented, and premiums will be awarded on all such as shall be declared worthy.

4. The committee on premiums, and all firms or partnerships in which they may be interested, shall be excluded from competition or the award of any premium.

5. All persons depositing articles, either for competition or exhibition, must attend to have them registered by the clerk, at which time they will receive a certificate, which will be required of them when the articles are returned.

6. Proof of origin must be furnished if required, for any specimen offered for premium.

7. Depositors will receive a ticket from the clerk, which will admit them with ladies during the exhibition.

8. Arrangements will be made to exhibit, in operation, all working models that may be deposited—contributions in this branch are invited—a competent person will take charge of all models sent for the above purpose.

9. The morning of each day, until 15 minutes before 10 o'clock, shall be appropriated exclusively to the judges.

10. Members will receive their tickets of admission by applying at the institute rooms, any time in the week previous to and during the exhibition.

11. All articles offered by apprentices, will be received, and adjudged as the production of apprentices: they must furnish a certificate of name, age, with whom, and the time they have served as apprentices.

12. Articles subject to injury by being handled, should be secured in glass cases.

13. Contributers are requested to have a person to take charge of their goods, &c., during the hours of exhibition, as the managers cannot be responsible for any injury which may occur during that time: in the intervals, efficient measures will be taken for their protection.

NEW YORK & ERIE RAIL ROAD

☞NOTICE TO CONTRACTORS.—Sealed proposals will be received by the subscriber until Wednesday, 15th of August next, at 9 o'clock P. M, at the office of the company, at Tappan Slote, Rockland County, New York, for the grading bridging and masonry of ten miles at the eastern termination of the New York and Erie Railroad.

The maps and profiles, together with the specification and plans of the materials, and the manner of construction, will be ready for examination at any time after the 10th August next, at the office at Tappan; where all requisite information relative to the work will be given, and blank proposals furnished. Some of the sections will be heavy, and will require a considerable quantity of rock excavation.

Security will be required for the performance of contracts. Persons who are unknown to the subscriber, or to the Engineer, will be expected to furnish satisfactory testimonials. No transfer of contracts will be recognised. Individuals proposing for more work than they wish to contract for, must specify the quantity they wish to take.

The undersigned reserves the right of rejecting all propositions which appear incompatible with the interests of the company.

For further particulars, apply to H. C. SEYMOUR, Civil Engineer, Tappan, Rockland county, N. Y.

SAMUEL P. LYMAN,
Commissioner of the New York and Erie Railroad Company.
July 15, 1838.

LOCOMOTIVE ENGINES.

The subscribers have for sale in England, on account of whom it may concern:

Two very superior light locomotive engines with tenders, &c. complete. These engines are suitable for roads, the superstructure of which are of wood with flat bars. They are of BURY'S celebrated pattern, and would no doubt give great satisfaction:

ALSO—

Two 6 wheel engines of 11 tons weight, with fuel and water. These engines are of very superior workmanship. One of them could be delivered at New York, and the other in Philadelphia;

ALSO—

Two 4 wheel engines, warranted by the manufacturers not to weigh more than 7½ tons, with fuel and water. These engines are of a lot of 8 made at one establishment, of a particular pattern. Some of them are now running, and give very great satisfaction.

A. & G. RALSTON & CO.
South Front st. Philadelphia,

Who have on hand 800 tons of T rails, 2¼ by 5-8, 2 by ½, 1¼ by ½, 1 1-4 by 1-4 and 1 by 1-4 flat bar rail road iron. Also Rims for Locomotives, cars, &c. &c. Orders for rail road iron executed as usual,

3 2m

☞We ask the attention of our readers to the following notice of the Chief Engineer of the James River and Kanawha company

NOTICE TO CONTRACTORS.

James' River and Kanawha Improvement—Virginia.

A public letting will be held in the town of Lynchburg, on the 12th September next, of all the work not now under contract, on the line of the canal between that place and the city of Richmond.

This work consists of 39 locks, 43 culverts, 3 aqueducts, 2 towing path bridges, (one of which is across James' river,) about 120 farm and road bridges, and from 30 to 40 sections, besides several heavy sections between Lynchburg and the Blue Ridge.

The locks will generally be of dry masonry sheathed with plank.

The situation of the work will be pointed out to contractors by the assistant engineers on the line; and the general plans and specifications will be exhibited at the office of the subscriber, in the city of Richmond, until the 9th of September and in Lynchburg at the time of the letting.

The valley of the James River is remarkably healthy.

CHARLES ELLET, Jr.
Chief Engineer of the J. R. and K. Company. 3 ts8

SUBSCRIBERS

Will please take notice that this journal can only be sent to those who pay for it The delay of payment by many who had received it for years, caused the suspension of its publication for six months, during the past year. Its publication has, however, been again resumed, and the *first six numbers* have been, or will be, sent to all who were subscribers at the period of its suspension, and continued regularly to all who shall *then have paid for the current year*; but after that period, it will *not be sent to those whose accounts are unpaid*; as a want of means will compel us to publish *only* a number sufficient to supply those who pay. This measure is adopted from *necessity*, not from choice, and we hope therefore that each subscriber will remit the amount due, without delay, as we shall not be able to supply them with the numbers *after* we diminish the number published.

The annexed bill shows the condition of the account, where there is a balance due, according to our books; and you are respectfully requested to remit the amount by mail, without delay, *at our risk*.

*Mr.*_____

TO THE OFFICE OF THE **RAILROAD JOURNAL**, Dr.

To Months Subscription, from

183 to 183 $

Not charging for the period of six months, during which the publication was suspended.

NOTICE TO RAILROAD CONTRACTORS.

Western and Atlantic Railroad of the State of Georgia.

In addition to the 50 miles of this railroad farmed out for construction in April last, the grading and masonry on another equal portion of the same work, is now offered for contract.

SEALED PROPOSALS

Therefor, will accordingly be received at the office of the board of commissioners in Cassville, Cass county, Georgia, between the eighth and thirteenth of October next, during which time, engineers will be in attendance on the line of the road to point out the localities, and explain by the aid of plans and profiles of the route, the nature and extent of the work to be done.

This portion of the route traverses a limestone region, abounding in springs, and streams of fine water. The climate of the country is mild and salubrious. The frosts of winter are never so severe as to prevent easy and successful grading, even in the most inclement part of that season.

The time for the fulfilment of contracts will be amply sufficient for this purpose.—This and all other conditions relating thereto, will be exhibited in printed proposals and articles of agreement, blank copies of which will be in readiness for inspection, filling and signature, at the time and place above designated.

Credentials setting forth the character and competency of the contractors unknown to the commissioners will be required.

By order of the board of Commissioners.

S. H. LONG, Ch'f Eng'r.

Office of the W. & A. R. R.
Marietta, July 12, 1838. 4 4t

AMERICAN

RAILROAD JOURNAL,

AND

MECHANICS' MAGAZINE.

No. 4, Vol. I. New Series.] AUGUST 15, 1838. [Whole No. 315. Vol. VII.

For the Railroad Journal and Mechanics' Magazine.

Remarks upon Sherwood's Magnetic Discoveries. By ALEXANDER C. TWINING, Civil Engineer.

PUBLIC attention has been lately directed to the report of certain important discoveries in magnetism, made by Dr. Henry Hall Sherwood, and communicated by him to the Congress of the United States, at their last session. Dr. Sherwood's Memorial gave rise to a Legislative Report, offered by the Hon. Mr. Tallmadge, of the Senate, of which five thousand copies were printed, and which, of course, has been extensively circulated. This Report will be the subject of a few remarks, very obvious in themselves, but which seem to be called for by the prominent attitude in which the subject now stands before the scientific community.

Dr. Sherwood, in his Memorial to Congress, declares himself to be the inventor of a method of ascertaining *the latitude and longitude of any place* (as well as certain other valuable elements of knowledge), and this either at sea or on the land, and in all weathers, without a celestial observation, but *by the dip of the needle merely.* He professes to have composed extensive tables to facilitate the calculations of latitude and longitude, variation of the compass, &c. from the dip, and has offered his discovery to the severe test of actual trial. In pursuance of this offer, we are informed in the documents accompanying this Report, that numerous trials were in fact publicly made, and that the results have always verified the theory. Indeed, the documents themselves embody the results of several such trials, in which Dr. Sherwood is said to have computed, from the dip or the variation, the longitudes and latitudes of Washington, New-York, St. Louis, Valparaiso, and other places; and, in every instance, the results, as there set forth, exhibit an accordance with those of astronomical observation, which leaves little to be desired on the score of accuracy and nice agreement. To make the whole more imposing, and give evidence of the correctness and high practical value of Dr. Sherwood's discoveries, testimony of another kind from men of high respectability and talent is also introduced into the documents alluded to.

Now the first remark which seems to be called for, in relation to the foregoing statements, is this—that the very proposal of Dr. Sherwood

carries an absurdity on its face, and one that may be made so plain to every man in the least acquainted with these subjects, as not to admit of question. The inventor proposes, by means of the dip merely, (provided he is also furnished with the time when that dip was observed) to determine the latitude and longitude of the place of observation. But the truth is, that for every assignable dip, except that of 90°, where the needle is perpendicular to the horizon—there exists an indefinite number of places on the globe at which that same dip obtains. At any place whatever, except the magnetic poles themselves, if you permit the dipping needle to take its position, it is possible, by going either easterly or westerly, to take a line all round the globe and back to the point of starting, through the whole of which the needle shall maintain its dip unvaried. The proposal therefore is nothing less than this—to determine specifically that which is in its own nature incapable of determination by the means proposed. To attempt finding the latitude and longitude of a place by the *dip merely*, is a problem as indeterminate as it would be to find the unknown sides and angles of a triangle from but one side and one angle given.

I do not deny that it may become possible, at a future day, when the laws which govern terrestrial magnetism shall have been fully developed, to determine, with greater or less precision, the latitude, longitude, dip, or variation at a given place and time, by having *any two* of the above named elements given,—for example, by the dip and variation both given, to find latitude and longitude; or, by the dip and latitude both given, to find longitude and variation, &c. &c. I have looked carefully to ascertain whether injustice has not been done to the author of the invention in question by a loose statement of the means he proposes to employ for his object; and whether, in fact, more elements have not been used in his computations than had been unguardedly stated. But I have found no indication to this effect. The language is uniform, in the original memorial, in the legislative report, in the expositions of the theory which accompany the report, and most of all, in the examples there given to exhibit the actual processes. In all it is the dip merely, or the variation merely, which is given in connection only with the time of the observation, and the magnetic hemisphere in which it was taken.

But, even if there were room left to suspect an oversight of the kind suggested, there is a second circumstance which, equally with the first, goes to subvert the whole professed discovery. It is this—that the pretended results of Dr. Sherwood's computations, as given in the Congressional documents, although exhibiting an apparent consistency with facts already known, are nevertheless utterly at variance with the *legitimate* results of the very theory from which they purport to be derived. There is no need of new and voluminous tables to compute the results of Dr. Sherwood's hypothesis, they being all within the compass of simple spherical geometry. That hypothesis, as set forth in the memorial and documents heretofore alluded to, simply propounds as follows: that the earth has two magnetic poles, an arctic and an antarctic, situated in the polar circles, at points diametrically opposite, and completing a revolution westward in those circles once in 666 years, very nearly, or at the rate of 32′ 26″ annually; that the longitude of the arctic magnetic pole, on the 15th of September, 1837, was 93° 16′ 03″ west; that the meridian of no variation had also then a position which the theory assigns; that the magnetic equator is a great circle of the earth perpendicular to the magnetic axis, and makes of course an angle of 23° 28′ with the terres-

trial equator; and finally, that the dip of the needle is always equal to its distance from the magnetic equator, that is, to the magnetic latitude.

With the foregoing elements, then, for my guide, I turn to page 16 of the documents, and select for verification the example No. 9 there given; being the "Latitude of Washington, from dip observed by Lieut. Wilkes, June 26, 1838. Dip=71° 13′ 30″." In this example the latitude, as computed by the author of the hypothesis, came out with a variation of only about two minutes and a half from the truth; and even this small difference was explained by Dr. Sherwood to be due to a slight error of the observed dip, caused by an imperfection of form in the dipping needle used, and which was pointed out to Lieut. Wilkes by Dr. S. before commencing the computation. Now the latitude of Washington is given at 38° 52′ 44″; and supposing a spherical triangle constituted between the place named, the terrestrial pole and the magnetic pole, we have the three sides of the triangle as follows:—

First, the distance of the two poles, . . .	.=	23° 28′ 00″
Second, the north polar distance of Washington, being the complement of the latitude . . .	.=	51 07 16
Third, the magnetic polar distance of Washington, being the complement of the dip . . .	.=	18 46 30

This is the triangle which the hypothesis supposes, and a glance will show it to be one whose two smaller sides are together less than its third side, and which involves, therefore, an obvious absurdity. The fact is, that the greatest dip which, according to Dr. Sherwood's theory, could ever obtain at Washington at any period of the magnetic revolution, would be 62° 20′ 44″, or about nine degrees less than the true dip, as observed by Lieut. Wilkes. So much for example No. 9.

I next select example No. 4, on page 14. In this instance the testimony is, that the dip was furnished without naming the place of observation; and the demonstration of the hypothesis consists in the alleged fact, that Dr. Sherwood wrought out the latitude and longitude correctly, and thereby discovered the true place, from the dip alone. It proved to be a dip that was taken by Basil Hall, at Guyaquil. This dip is stated at 12° 11′ 30″, and was given to Dr. Sherwood only with the accompaniments of its having been taken in the year 1821, and "west of the line of no variation and south of the equator;" it being necessary for the computer to know (see page 11) "if the dip be given, whether the place of observation is east or west of the circle of no variation; and if the variation be given, whether it is north or south of the magnetic equator." From the terms enunciated—no denomination being given to the dip as north or south—one would suppose it *south;* it having been taken "south of the equator"—meaning the magnetic equator. On this supposition, if we constitute a triangle whose sides shall be—the north polar distance of Guyaquil, the arctic magnetic polar distance of the same, and the distance of the two poles (23° 28′) and compute the longitude of the place of observation, the result is, that Capt. Hall must have mistaken his longitude by an entire hemisphere, and have been really in the central wilds of Africa instead of being, where he thought, upon the western seaboard of South America. In relation, however, to this truly wonderful result of the hypothesis in question, perfect fairness may, perhaps, require us to admit a probability that the word "*south*," in the enunciation, ought to have been printed "*north*," in which case the error of longitude would appear more moderate, not transferring the real place of observation

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more than one-eighth part of the circumference of the globe, from Guyaquil eastward. The truth is, that at Guyaquil, the dip, in the year 1821, is required by the hypothesis to have been 21° 13′, instead of 12° 11′, the quantity furnished to Dr. Sherwood, and from which he professed to derive, by his process, the latitude and longitude. If any one should here propose the question, by what magical process it is that Dr. Sherwood was able to determine the situation of a place, not previously known to him, not only by the use of an element which in its own nature must leave the situation indeterminate, but by the aid of a theory itself utterly irreconcileable with the professed result—I can only attempt a random solution. It is certainly supposable, in this instance, that the operator with Dr. Sherwood's process, upon the mention of the dip (12° 11′ 30″) and of the time of observation (1821) *might* recognize it as a dip with which he was already acquainted, and which he knew to have been observed by Capt. Hall, at Guyaquil.

Several other criticisms upon the documents accompanying the Legislative Report might be offered, but the few already made are sufficient for the object now in view, and perhaps even more than sufficient.

New-Haven, August 3d, 1838.

Semi-Annual Report of the Water Commissioners, from the 1st of July to 30th December, 1837, inclusive.

(Continued from page 66.)

C

Report of the Chief Engineer in relation to the Plan for crossing Harlaem River.

New-York, December 12, 1837.

To the Honorable the Board of Water Commissioners of the City of New-York—

GENTLEMEN,—In examinations made with a view of deciding on the most proper method, or plan, for carrying the Croton Aqueduct over Harlaem River, I find that the late Canvass White, Civil Engineer, in his report of January, 1826, to the Directors of the New York Water Company, proposed to carry the waters of the Bronx over this river, by means of iron pipes. The pipes to be supported on a "permanent stone bridge," which he proposed to construct at Macomb's Dam. The surface of water in the reservoir, from which it was received by the pipes, on the north side of the river, was about 80 feet above mean tide. No particulars were given in his report relating to the manner of constructing the bridge; but from the general plan, there is no doubt but he designed a bridge, only sufficiently elevated above the water of the river, to support his pipes and form a roadway.

John Martineau, Civil Engineer, in his report of January, 1835, to your Board, proposes to cross Harlaem River by an "inverted syphon," made of wrought iron, 8 feet in diameter, and supported on a bridge, composed of one arch of 60 feet span, over the channel way, and the remainder by a stone embankment 30 feet high.

D. B. Douglass, Civil Engineer, in his reports of November, 1833, and January, 1835, recommends a bridge of stone masonry, by which the regular inclination and grade of the aqueduct would be maintained. Major Douglass presented comparative estimates of the cost of this plan,

and that of an "inverted syphon," supported on a low bridge; and Doctor Martineau only of crossing by an "inverted syphon."

With some difference in detail, it therefore appears that Messrs. White and Martineau recommended crossing by iron pipes, supported on a low bridge, and Major Douglass by a high bridge, maintaining the grade line. Of the practicability of either of the two methods, there is no doubt. The great question is, to determine which, under all the circumstances, will most economically secure the desired object of passing the water over this valley. In the different methods that have been proposed, I have not been able to obtain the detail by which the several difficulties were to be overcome, and the estimate of expense obtained. The records to which I have had access, only giving the general features, and I have seen no drawings of either.

In order to present the subject fully to the consideration of the Board, I have, in compliance with your instructions, prepared plans and estimates of each method, which will be submitted with this report.

The width of the Harlaem Valley, at the grade line, 1450 feet; of which 620 feet is on the high water line of the river. The level, of mean tide is 118 below the grade level, or 131 below the top of the parapets designed for the bridge.

In April last, Mr. Carmichael was instructed to prepare a suitable float, and with sounding rods to examine the bed of the river. In the first place, he proceeded on the line of aqueduct as located across the river. He found no difficulty in sinking the rod through the mud; but the sand which lies in a great portion of the bed, from 4 to 8 feet deep on the rock; frequently requiring much perseverance to get through it. Commencing at the southern shore, rock was found at a pretty uniform level for 220 feet, and ranging from 24 to 33 feet below high tide. At this point the rock changed, and became very irregular, and a stratum of gravel at several places, prevented the rod from reaching the rock. Lines on each side of the centre, at 20 and 40 feet distant, were also examined; and both above and below the centre line, the rock was found *more* regular at less depth of water on the westerly side, and at a greater depth on the easterly side of the centre line. The result was less favorable than had been anticipated from previous examinations, and led me to direct surveys, with a view of finding a more favorable place for crossing. After all the examination was deemed necessary, a line parallel to the located line, and 60 feet westerly from it, was considered as presenting the greatest advantages for an aqueduct bridge. At this point the rock was found more regular, and varying from 32 feet near the south shore, to 20 feet below high water line, near the north shore. There is at this location a less depth of mud and sand, and consequently greater facility in constructing coffer dams. The sand is not a material impediment, and, in some respects, very useful; but the mud is likely to do much harm and no good. At this location the foundation of the piers will range from 18 to 32 feet below flood tide, and average about 25 feet. The elevation of the parapet of the bridge above the lowest foundation of pier will be 163 feet.

In deciding on a plan for an aqueduct bridge at this place, the depth to which the hydraulic foundations require to be sunk, involving heavy expenses in coffer dams and pumping, has an important influence in determining the span of the arches. After much examination, I have arrived at the conclusion, that 80 feet span for the arches over the river, and diminishing by one of 70 and one of 60, to 50 feet span for the arches

on the table land on the north side, will most effectually combine stability, permanence, symmetry, and economy in the structure.

The piers for the large arches, from their great height, should be constructed hollow, in order to ensure stability, at the least expense. A greater width of pier is required to give support to the arch, and resist its horizontal thrust, than is required to bear the vertical weight of the superincumbent mass. In ordinary cases, particularly for arches of small span, it is the usual practice to give the proper breadth of pier, by filling the interior with rubble masonry, only dressing the face stone. But in piers of great height, designed for arches of large span, this method is not advisable, for the following reasons:

The interior masonry not being dressed as well as the exterior, is liable to settle more, and eventually force the face stone to bulge outward, and injure, if it do not destroy the work. A second reason is, the tendency that a large mass of masonry has to prevent the uniform and early hardening of the cement. The piers for the arches of 50 feet span, will be much lower, and may be made solid.

For all the hydraulic foundations, it is believed rock may be obtained; but for several of the piers on the table land, it is not probable we can find rock within a reasonable distance, and an artificial foundation of concrete and piling must be resorted to. This will require an excavation of 12 to 15 feet deep, in order to get the piles so low, as to prevent, in a great degree, their decay. The concrete should be filled about 3 feet deep, so as to constitute a safe foundation after the piles decay; at which time it will have become very solid.

The most difficult part of this work will be found in laying the foundation rock bare, and raising the pier above the water. All the other parts may be entered upon, and completed on well known mechanical principles. But the work of putting down coffer dams, in water averaging 25 feet deep, making the work impervious to water, and securing it against failure, from the great pressure that must act against it, involves much difficult labor, and is subject to great contingencies. Works of this kind have recently been accomplished in this country. The rail road bridge over the Schuylkill, near Philadelphia, has one of its piers on a hydraulic foundation of 29 feet deep; and the foundations of several of the piers, and one of the abutments for the Potomac Aqueduct, have been put down in 28 to 35 feet water, under the direction of Capt. Turnbull, of the U. S. Engineers, which shows the practicability of executing such works; and, at the same time, a history of their progress also shows that there is much contingency in their execution, and we are thereby admonished to make large estimates for similar work.

The plan of a coffer dam which I have prepared, and from which the estimate of expense has been made, is similar, in its general principle, to that last adopted by Captain Turnbull, on the Potomac Aqueduct. It is proposed, however, to excavate the mud between the pile sheeting, and allow the clay puddle to rest immediately on the sand which appears compact; and thus remove the difficulty experienced on that work, from the soft mud being forced through, between spaces that are sometimes unavoidably left between the pile plank, and thereby causing sudden and heavy leaks. This excavation in deep water will, doubtless, be attended with much difficulty and expense; but it is important that it should be removed, and I believe it may be done by means of dredging bags, if no better mode should be devised. This process of excavation is a slow and expensive one, but has been found effectual, in several instances, in

dredging the channels of rivers in England. There is another point in which the work referred to experienced considerable difficulty, and which circumstances then did not admit of a similar remedy; that is, in the great strain which the earth in the coffer dam brought upon the tie timbers on the top, and which I propose to relieve by throwing a bank of earth, in the form of a triangle, on the outside of the dam.

The masonry of the hollow pier is designed to be of large stone, uniformly thick in each course, and to be dressed to a joint, not exceeding 3-16ths of an inch in their beds, and their upper and lower beds to be parallel. The vertical joints to have a draft equally close, and the centre and rear not to exceed half an inch. In other respects, the masonry is designed to be of similar character to that proposed in my report of the 8th February last, with such modifications as the peculiar character of the work demands.

It is believed that suitable stone may be obtained in the immediate vicinity, for all the work, except the ring or exterior arch stone. The quarry has only been opened to a very limited extent; and it is therefore possible, that it may not be found, for an extensive operation, as good as it now indicates. It is a gneiss rock, and presents more regularity of formation than is usual for its kind in this district. It has a good texture, and the appearance of great durability; and will be hard to work, both in quarrying and dressing.

In making the estimate for masonry, I have been governed by the value of work that has *much* similarity, as the same has been estimated for contract, by several of the most competent men in this department of masonry. We have no work that is *precisely* similar—that is, of the same magnitude; that from its elevation and inconvenience of access, will be as expensive in laying up; that requires so great a proportion of large stone, or the same exactness of execution; at the same time, there is sufficient resemblance to constitute a guide, that with careful application will not lead us materially astray in computing the expense.

The arrangement for guarding against leakage and the influence of frost, is similar to that proposed in my report of the 8th February last, for the Sing Sing Bridge, with the addition of an opening in the side or parapet walls, subsequently proposed for that bridge, in my report of 31st August last. The opening in the side walls was suggested by R. F. Lord, Esq., Engineer of the Delaware and Hudson Canal Company, and I consider it a valuable improvement.

ESTIMATE FOR ONE COFFER DAM.

5,500 cubic feet of oak timber, at 30 cents . . .	$1,650 00
1,000 " white pine, at 18 cents . . .	180 00
90,000 feet board measure, of heart yellow pine, at $30 .	2,700 00
20,000 " white pine scantling, &c., for scaffolding, at $16	320 00
2,000lbs, wrought iron straps, bolts and spikes, at 12 cents.	240 00
Pin timber and treenails, estimated	50 00
Driving 470 feet of sheet piling, at $2	940 00
Driving 60 guide piles, at $3	180 00
Carpenter work and launching frame of dam, estimated .	1,500 00
Excavating from interior of dam, 600 cubic yards of mud, at $1	600 00
500 cubic yards excavation in foundation pit, at 50 cents .	250 00
Carried forward	8,610 00

Brought forward . .	$8,610 00
1,600 cubic yards puddled earth in dam, at 50 cents	800 00
Pumping during time of excavating pit, putting in lower timbers and raising the masonry above water, probably 90 days with a 20-horse engine, including use and repairs of engine and pumps, estimated at $20 per day	1,800 00
	$11,210 00
Add for contingencies on account of the peculiar uncertainty of this work, 25 per cent.	2,802 00
Total cost for one pier	$14,012 00

As a portion of the timber used in one dam may be drawn up and used in a subsequent one, or may be used for other purposes, the average for the seven piers may be put down at $13,000 each, or $91,000 for the whole.

Having given such a description as, I trust, with the plan herewith submitted, will present a satisfactory illustration of the basis on which the computation is made, I now proceed to present a detailed estimate of the probable expense of crossing the valley, by a high bridge, maintaining the regular inclination of the aqueduct.

ESTIMATE FOR HIGH BRIDGE,

Maintaining uniform inclination of Aqueduct.

2,000 cubic yards excavation for foundation at 16 cents .	$320 00
500 bearing piles for foundation of land piers, at $5 . .	2,500 00
7 coffer dams, including pumping and excavation of hydraulic pits, per detailed estimate, at $13,000 . . .	91,000 00
3,320 cubic yards in abutments and wings, at $8 . .	26,560 00
480 " concrete masonry in foundation of piers on table land, at $6	2,880 00
20,550 cubic yards piers, at $18	369,900 00
3,460 " large arches, at $30	103,800 00
1,090 " small arches, at $25	27,250 00
Centering for 16 arches, estimated	30,000 00
5,480 cubic yards exterior spandrels and pilasters below water table, at $12	65,760 00
3,660 cubic yards interior ditto and hance wall, at $6 .	21,960 00
11,100 cubic yards parapets, including pilasters and all other stone masonry above water table, at $10. .	111,000 00
1,060 cubic yards cut stone in water tables, parapet coping and ballustrade railing, at $30	31,800 00
1,170 cubic yards brick facing at $11	12,870 00
1,320 lineal feet cast iron lining, at $25	33,000 00
1,300 cubic yards foundation and protection wall, at $2 50	3,250 00
2,000 cubic yards embankment at 20 cents	400 00
115 feet of aqueduct masonry, from ends of bridge to intersection of grade level with surface of ground, at $31 . .	1,495 00
Total cost of High Bridge	$935,745 00

(To be continued.)

Fifth Annual Report to the Building Committee of the Girard College for Orphans; by Thomas U. Walter, Architect.

(From the Journal of the Franklin Institute.)

Gentlemen:—I have the honor, in conformity with your resolution of the 26th inst., to communicate the following report on the progress of the work during the past year.

The marble work of the centre building is raised to the height of the third story floor; all the arches over the second story are completed, and the quoins are commenced for the vaulting to support the roof; nearly all the marble required to complete the cell of the building has been wrought —two of the large antæ capitals are finished, and the workmen are now engaged in executing the other two; three of the columns on the eastern flank have been raised to their destined height, two more are ready to receive their capitals, and two others are more than half finished; one of these columns has been fluted and entirely completed, and the fluting of another is nearly finished; several of the large architraves have been delivered; also about 7000 cubic feet of marble for bases, capitals, and columns, beyond what has been used, nearly all of which will be wrought during the winter.

The carpenters are now about commencing the centres for the third story arches, all of which will be ready to set as soon as the spring opens.

The easternmost out-building, which embraces the dwellings of the Professors, is nearly completed, and the building nearest the College is in such a state of forwardness as to admit of its being finished (if required) in three or four months; I am, however, of opinion, that neither of these buildings should be entirely completed until the time shall have been agreed upon for occupying them, as new buildings deteriorate much faster without occupants than with them; it would, therefore, be better to keep them in such a state of forwardness that possession may be given at a few weeks' notice.

The whole quantity of marble that has been delivered during the past year, amounts to 37,648 cubic feet; 31,974 superficial feet have been wrought and used in the building, and there are now on the ground about 13,500 feet of finished work, 1828 feet that have been sawed principally fer ashlar, and 5564 cubic feet in the rough.

There have been 873,150 bricks delivered at the work during the last season, which, together with the 500,000 left on hand from the previous year, make 1,373,150, of which 1,211,150 have been used in the building, leaving 162,000 bricks now on the ground.

All the contracts, have been faithfully executed and every part of the work reflects the highest credit upon the superintendents of the various mechanical branches; an unusual degree of skill and industry has been evinced by the workmen, and the most perfect harmony has prevailed in all the departments of the work.

The delivery of marble during the past year has fully equalled our expectations, and there remains no doubt that the contractors will be able to continue the supply as rapidly as it will be required.

The expenditures, from December 31st, 1836, to December 30th, 1837, amount to $181,839 79.

There is now on the ground about $85,000 worth of materials and workmanship which have not yet been used in the building, and which includes capitals, bases, column blocks, and architraves for the portico, the marble for finishing the cell of the main building, and the steps and yard walls of

the out-buildings, all of which will be available for the work of next season.

The building is now in a situation to admit of more work being done during the ensuing season than has been accomplished in any one year since its commencement; the marble work of the cell being nearly completed, there will be nothing whatever to interfere with the progress of the brick work; all the arches of the third story may therefore be constructed, and the building prepared for the roof, before the close of the season, the columns and architraves of the flank porticoes, and the steps and yard walls of the out-buildings, may also be readily finished during the next year, as the whole attention of the stone-cutters will be directed to these objects: about $285,000 will be required to accomplish this amount of work; it therefore only remains for you to say whether the buildings shall be advanced thus rapidly or not.

A temporary roof has been constructed over the whole of the main building, and the greatest precaution has been taken to prevent injury from frost; conductors have been made to lead the water from the top of all the arches into sinks in the cellar, for the purpose of preventing the rains that fall on the work during the summer from percolating through the abutments and arches, and saturating the work in the lower stories.

Temporary furnaces for drying and warming the building during the winter have also been constructed, and the warm air introduced into every room in the house, notwithstanding the unfinished state of the work; this arrangement was deemed expedient, not only to prevent injury to the arches from congelation and consequent expansion by cold, but also for the purpose of evaporating as much dampness from the walls as possible, previous to the occupancy of the building.

The expansible properties of *iron* having been a subject of considerable conjecture in reference to the bands for resisting the lateral pressure of the arches, I was induced to make an experiment for the purpose of discovering the actual difference of temperature produced in the middle of the walls, by the extreme heat of the summer and the severest cold of winter.

Although I have never had an idea that any evil could possibly result from the expansion of the iron in question, by an increase of temperature, the materials which surround it being subject to an expansion almost (if not quite,) equal to that of the iron, yet the satisfaction to be derived from positive evidence on the subject is sufficient to give interest to the experiment; I shall therefore give a brief account of the manner in which it was conducted, so as to enable you to judge how far the result may be relied on.

The place selected for the experiment was the brick wall between the south vestibule and the large rooms; the thickness of this wall is five feet five inches, and its distance from the south front of the cell twenty-six feet; the sun had therefore full power upon it during the summer, and in the winter the whole building was covered with a temporary roof: I should also remark, that the experiment was completed before any fires were made in the furnaces.

On the 23d of September, 1836, the temperature on the work being at 82° Fahrenheit, a self-registering *minimum* thermometer was placed upon the iron band in the middle of the wall, and the work constructed as solidly around it as the rest of the building.

On the 29th of July, 1837, the temperature being again at 82°, a hole was made in the wall, and the thermometer taken out, when it was found that the register had descended to 42° during the intermediate winter, the

extreme cold of which was 3° below zero: thus we find the greatest cold in the middle of the walls to be 42°.

On the 16th of January, 1837, the temperature on the building being 24° Fahrenheit, a self-registering *maximum* thermometer was placed on the iron band in the middle of the aforementioned wall, on the same horizontal line with the other thermometer, and about sixty feet distant from it, a space having been left in the wall when it was built, for the purpose; which space was walled up around the thermometer as firm and compact as the rest of the work.

On the 16th inst., the temperature on the building being again at 24°, the walling was taken out, when it was found that the register in the thermometer had gone up to 61° during the intermediate summer, the greatest heat of which was 94°.

We have therefore 42° for the lowest temperature of the iron bars, and 61° for the highest, making a difference of 19°.

The expansion that an increase of temperature of 180° produces upon malleable iron, is given by Dr. Ure, in his Dictionary of Chemistry,* as follows:

From experiments by Smeaton $\frac{1}{794}$ of its length; according to Borda's experiments $\frac{1}{860}$ of its length; and according to Dulong and Petit $\frac{1}{846}$ of its length.

Mr. Hassler, (of New-Jersey,) in his "Account of Pyrometric Experiments," read before the American Philosophical Society, June 29, 1817,† finds the expansion to be equal to $\frac{1}{795}$ of its length; and in a work on Natural Philosophy, by Biot,‡ we have the experiments of Lavoisier and Laplace, made in 1782, giving an expansion, under the same increase of temperature, equal to $\frac{1}{3519}$ of its length.

The trifling difference in these results may be attributed to a difference in the density of the material.

Now, if 180° will increase a bar $\frac{1}{794}$ of its length, (this being the greatest expansion obtained by the foregoing experiments,) 19° will lengthen it only $\frac{1}{7852\frac{1}{2}}$; hence the bands around the rooms of the College, (each being 54 feet long from the points of support,) will be subjected to a difference in their length between the extreme heat of summer and the severest cold of winter, of $\frac{1}{7852\frac{1}{2}}$, or $\frac{1}{1\frac{1}{2}}$ of an inch.

This being the actual difference produced in the length of the iron bands, by the greatest change of temperature to which they can be subjected, it remains for us to consider the expansibility of the materials with which they are surrounded.

A table on the expansion of different kinds of stone, &c., from an increase of temperature, is given by Mr. Alexander J. Adie, civil engineer, in a paper read before the Royal Society of Edinburgh, on the 20th of April, 1835,‖ in which he makes the expansion produced upon bricks by 180° of Fahrenheit, equal to $\frac{1}{1818}$ of its length, or $\frac{1}{2\frac{1}{6}}$ of an inch in 54 feet under an increase of temperature of 19°.

If, therefore, the maximum expansion of one of the iron bands in the wall of the College is $\frac{1}{1\frac{1}{2}}$ of an inch, and the brick work surrounding it $\frac{1}{2\frac{1}{6}}$, the difference is then reduced to nearly $\frac{1}{2\frac{1}{2}}$ of an inch: but if we consider that the variation of temperature in the interior of the wall is only 19°,

* Ure's Dictionary of Chemistry, page 272.

† Transactions of the American Philosophical Society---new series-- Vol. I. p. 227.

‡ Physique de Biot, Vol. I.

‖ See Journal of the Franklin Institute of the State of Pennsylvania, Vol. XX. p. 200.

while the exterior is subjected to the extremes of heat and cold, it will be obvious that the aggregate expansion and contraction of the brick work is even greater than that of the iron.

From these considerations it is evident that not the slightest injury can possibly result from the use of iron in the construction of the College.

I am, gentlemen, very respect fully your obedient servant,

THOMAS U. WALTER, Architect.

Girard College, December 30th, 1837.

To JAMES HUTCHINSON, ESQ.

Chairman of Building Committee, Girard College for Orphans.

Specification of a Patent for a process for protecting articles made of Iron or Steel from oxidation. Granted to M. SOREL, *of the city of Paris in the Kingdom of France. December*, 1837.

To all whom it may concern; be it known, that I, M. SOREL, of the city of Paris, in the Kingdom of France, have invented, or discovered, a process, method, or methods, by which various articles made of iron or steel, may be effectually preserved from oxidation, or rusting, by the galvanic action produced by zinc, and I do hereby declare that the following is a full and exact description thereof.

It is well known to chemists and to all persons versed in the physical sciences, that a galvanic action is produced by the contact of two metals different in their natures, and that the most oxydable of the two metals so brought into contact becomes positively electrified; whilst that which is least oxydable becomes negatively electrified, and also that, when brought into this state, the most oxydable, or positively electrified metal, has a tendency to become oxidized, and will abstract oxygen from compounds containing this agent; whilst the least oxydable of the two metals will be protected from oxidation, although exposed to agents which would oxidize it, but for the contact of the negative metal. My process depends, for its efficiency in protecting iron and steel from oxidizing, or rusting, upon the manner in which I apply this principle.

The process of covering articles of iron with tin is well known, and is exemplified, most largely, in the manufactory of what is usually known under the name of sheet tin, or tin plate, which consists of thin sheets of iron coated with tin. In this material there is necessarily galvanic action between the two metals, but it is to the disadvantage of that which it is proposed to protect, namely, the iron, which being more oxydable than tin, becomes positively electrified, and has its tendency to rust increased; the protecting effect of the tin depending in this case entirely upon the perfectness with which the iron is coated by it; as is clearly evinced by the rusting of the iron whenever any portion of this coating is removed, and the iron is exposed to the action of air and moisture. Were the galvanic action in favor of the iron, it would be protected notwithstanding the abrasion of the tin, as its protecting influence is not limited to the mere point of contact, but extends far beyond it.

In the scale of the oxidability of the different metals, commencing with those which are the most oxidable, it has been found that zinc stands before iron, and it follows therefore, that when these two metals are brought into contact, a protecting influence will be exerted upon the

iron by the zinc, and that the rusting of the former metal will be thereby prevented.

It might be supposed from the fact that zinc is more oxidable than iron, that this metal, if employed to protect iron, would itself soon become oxidized, or rusted, and would consequently, leave the iron unprotected; and such reasoning would undoubtedly be just, but for another fact, well known to chemists, that there are certain metals, of which zinc is one, which after they have acquired a thin superficial coat of oxide, are thereby effectually protected from the further absorption of oxygen, under ordinary exposure.

Having thus fully exemplified the principle upon the application of which my process is dependent for its efficacy, I will now proceed to give the necessary details, and the various modes which I have devised, for carrying the same into operation. These modes which I have essayed, are five in number, and are as follows:

First, applying the zinc to the iron or steel in the manner in which tin is applied in the process of tinning.

Second, applying a galvanic powder in the manner of paint, which consists in mixing the zinc, reduced to fine powder, with oils or resinous materials, so as to form a paint or varnish, with which the substances to be protected are to be covered, in the ordinary manner of painting, or varnishing.

Third, covering the articles to be protected, with the galvanic powder, consisting of zinc finely comminuted.

Fourth, wrapping the articles to be protected in what I denominate galvanic paper.

Fifth, anointing or covering the articles with a galvanic paste, consisting of any suitable fatty matters, such as purified lard, in which the galvanic powder has been freely mixed.

The first process, that of coating the articles to be protected with metallic zinc, is to be effected much in the same manner in which tinning is performed, that is to say, the articles to be coated must be rendered clean, and free from oxide, by processes analogous to those followed in preparing them for ordinary tinning; such as immersing them in diluted sulphuric or muriatic acids, scouring them, and so forth; which processes being well known, need not to be described. The zinc, in like manner, must be fused in proper crucibles, or other convenient vessels, adapted to the nature and and size of the articles to be operated upon; special care being taken to keep the metal covered with sal ammoniac, or other proper flux; and to regulate the heat in such a way as is required by the volatile nature of the metal. The articles to be coated, after being dipped into the melted zinc, are to be withdrawn slowly, that too much of the metal may not adhere to them. They are then to be thrown into cold water, rubbed with a sponge, or brush, and dried as quickly as possible, as otherwise they may be injured by the appearance of dark spots, which it is desirable to avoid.

When chains for cables, or for other purposes, are being withdrawn from the zinc, they must be shaken until sufficiently cooled to prevent the links from being soldered together by the melted metal. The coating of small chains requires careful management, but by the following procedure it is effected without difficulty. Whilst in the dilute acid, they are to be moved about to expose all their parts equally to its action, they are then to be dipped into muriatic acid, and immediately dried in a reverberatory furnace. The melted zinc being ready, and covered with

sal ammoniac, the chains are to be put into it, and suffered to remain there about a minute; they are next slowly taken out by means of an iron skimmer, or other convenient instrument, which will allow as much of the zinc to drop from them as can be got rid of in that way; the links, however, will still retain too much zinc, and will be soldered together. To correct this they are to be put into a reverberatory furnace, to be covered with charcoal, and retained at a red heat for about a quarter of an hour, during which time they are to be moved about by means of an iron poker; by this treatment the excess of zinc will be discharged; they are kept in motion until the zinc is solidified. When small nails, and such like articles, are to be coated, the process should be performed in small crucibles, this being necessary to prevent the danger of spoiling considerable portion of zinc, which results when iron has been kept in it for a considerable length of time, as it is thus rendered unfit for the purpose of a protective coating. In all cases the purest zinc should be employed. Wire may be coated by passing it through the melted zinc, as it is wound off from one drum or reel on to another.

When articles of iron have been coated with zinc, it is sometimes desirable to cover this coating with one of tin; more especially when culinary vessels are the subjects of the operation. It may also be resorted to when it is desired to give a brighter and more handsome surface than the zinc affords; such a coating of tin will not destroy the galvanic effect of the zinc; and it is to be effected in the ordinary way of tinning, particular care being taken not to heat the tin too highly, or to keep the articles in it so long as to remove any portion of the coating of zinc.

The galvanic powder, consisting of zinc reduced to that state, may be obtained by various means; the following, however, I have found to be the most economical of any which I have essayed.

The zinc is put into a reverberatory furnace, and brought nearly to a red heat, care being taken to prevent the access of a current of air; it is then carefully skimmed, and covered with sal ammoniac.

Iron filings, equal in weight to about one-tenth part of the zinc, are to be moistened with muriatic acid, and thrown on the fused zinc; the whole is to be covered with finely pulverized charcoal, and the heat of the fused metal raised to whiteness, and so retained for a quarter of an hour, agitating it at intervals by means of an iron poker. The melted mass is then to be run off into a brick or cast iron reservoir, which is covered with a plate of cast iron to prevent the combustion of the zinc. Through an aperture on the cover, a poker, or stirrer is to be introduced to agitate the alloy, which is to be done until it is cool, when it will be in fine powder.

The galvanic paint is prepared by grinding this powder with the fluid which is to be employed to form it into a paint, or varnish. Various fluids may be used for this purpose. I have sometimes employed the oil distilled from coal tar. Coal tar itself answers well, with the addition of one-third of spirits of turpentine, or of a sufficient quantity to bring it to a proper consistence. For purposes where the odour of this mixture would be objectionable others may be substituted.

Articles of polished steel, or iron, packed in this galvanic powder, so as to be covered thereby, will be preserved from oxidation, even should they become moistened from any accidental cause.

Galvanic paper may be prepared either by the mixing of the powder with the pulp in the manufacturing of the article, or by taking the ordinary wrapping paper, coating it with any suitable adhesive substance, and sifting the galvanic powder over it. Polished, or other articles, wrapped

in such paper, will be effectually protected from rust by the galvanic action.

The preparation of the galvanic paste has been sufficiently explained, and its operation in protecting the articles coated with it will be readily understood, as it is analogous in this respect to those previously described.

Having thus fully explained the principle upon which my process of protecting iron and steel from rusting, or oxidating, is dependent; and having also given the various modes in which I have contemplated the carrying the same into effect, I do hereby declare that what I claim as of my invention, and wish to secure by letters patent, is the employment of zinc, in various forms, as a covering to the respective articles to be thereby protected, as herein set forth. I do not claim to be the discoverer of the principle of the protection of metals from oxidation by galvanic action: nor do I claim to be the first to have proposed the employment of zinc from the preserving of iron therefrom; masses of zinc having been applied, or it having been proposed to apply it in masses, to steam engine boilers, and probably to other articles, with this intention; but from this, my plan, or mode of procedure, differs as obviously as it surpasses it in efficiency, and in its applicability to numerous purposes in the arts where the application in masses would be impossible, or altogether unavailable. —*Ib.*

SOREL.

Lead Mine in Davidson County, N. C.

Extract of a Letter from Dr. AUSTIN, the senior Editor of the Western Carolinian, written from Davidson county, on the 27th June:

"Being in the vicinity of the *Lead mine* of Messrs. King, Thomas, and Company, I called to see the progress they are making in the work. Since my visit several weeks ago they have made considerable progress, and the place begins now to assume quite the appearance of a mining establishment: several houses have been built for the accommodation of the workmen; a substantial dam has been erected across the small creek near the mine, and pretty extensive works for washing, and cleansing the ores have been finished, and perform their offices well. A furnace too, for smelting the ores is nearly completed. The calculation of Mr. King is, that about the 4th July, the furnace will go into operation, and the smelting progress commence. The Company at this time, have 48 to 50 hands at work on the various operations connected with the establishment, and it is probable their number will soon be increased.

This vein, or lode of lead, was discovered last Fall by the owner of the land, who afterwards sold it to Mr. Roswell A. King & Co.,—the enterprizing gentlemen who are now carrying it on. He saw the indications of the ore on an elevated place in his field, where the back of the vein pointed out, and supposing it to be a gold, or silver vein, commenced sinking a shaft, and in the depth of a few feet struck into a perfect mass of ore, which turned out on trial, to be very rich. Mr. King & Co., have sunk or rather are now sinking two shafts some distance in advance of the first opening, with a view of cutting the vein at a depth of 90 or 100 feet; at the depth of 60 feet, they drove an adit to the vein, and found it to be large, and yielding quantities of fine ore. Thus far, the prospects of this lead mine are very flattering, and promise ample remuneration to the gentlemen engaged in it, for their spirit, and enterprize.

The character of the ores of this mine is what mineralogists call

carbonate of lead:—there are but few mines of this kind of ore in the world. It is said that the ores of the Le Motte mine in Missouri, are of this description. Most beautiful chrystals, or rather clusters of chrystals, are occasionally found in the ores taken out at this place. I have brought away with me several as Cabinet specimens. There are also large masses of what may be called the earthy oxide of lead, which, from all appearances are quite rich with the metal; I think it very likely that these ores are at a great depth, or in other parts of the vein, may assume the sulphuret character: in fact there are some strong indications of the change. I do not know that this change, should it take place, will add anything to the value of the mine, as I understand the Carbonate ores, are as easily managed as those of a Sulphuret character.

The crops in Davidson are promising. Wheat is very fine. Cotton is small, but has a good color, and is thrifty. Corn is rather backward for the time of year, but generally looks well.

A few days ago I visited the Lexington Cotton Manufactory, which is now on the eve of being started. It is a very fine establishment, and every thing about it seems to be admirably arranged. The Company have engaged as Manager a gentleman by the name of KERNS, who has extensive experience in the business, and whose skill and industry I doubt not will soon show themselves in successful results. This establishment will be quite an ornament to Lexington, and the gentlemen engaged in it deserve, and will meet success for the very spirited manner in which the whole enterprize has been gotten up, and thus far carried through. Davidson is the daughter of Rowan, but she seems to be going ahead of her parent.

Royal William Steam Ship.

New-York Harbour, July 24th, 1838.

To the Editor of the Courier and Enquirer—

SIR—As the American public took so much interest in the success of the "Sirius" and "Great Western," shewing by the kind reception they gave to the commanders of those vessels how sincerely the people of the United States were gratified at the solution of the great problem of crossing the Atlantic by ships propelled by machinery, I am confident I shall add still more to the public gratification, and more particularly to that of the scientific portion of the population, by giving a concise statement of the result of the "Royal William's" voyage from Liverpool. The ship left the river Mersey at 6h. 30m. P. M. of the 5th July, and arrived at her anchorage here at 5h. 35m. P. M. of the 24th of July, being 18 days 23 hours on the passage; but if I deduct three hours and a half, during which time her machinery was stopped for the purpose of attaching new packings, &c. when 9 days from Liverpool, the total time occupied in *steaming* was eighteen days nineteen hours and a half, and that *without any intermission whatever in working the machinery.* From Pilot to Pilot she was 18 days 19 hours. The "Royal William" is 276 horse power, on the condensed principle; she has three separate circular boilers worked at pressure under 8lb the inch; and the steam is economised by expansive valves. During the entire voyage across the Atlantic, the average expansion was 19 inches of a 66 inch stroke, and her total consumption of fuel was 351 tons 2cwt 2qrs from anchorage to anchorage,

leaving a sufficient quantity on board for 600 miles additional steaming, having still in her hold 59 tons 7cwt. She has worked the whole distance at an average of 2cwt.11lb per mile, or going more into scientific detail, 6lb. 4oz. per horse power per hour, a result, I believe, unprecedented at least in Europe.

Leaving England in the middle of summer, it may be said that her voyage has been long, and that her predecessors did more than she has done To prevent such an erroneous opinion going to the world, I give below a detailed statement of the different winds she has encountered on the passage; winds as adverse as any winter season generally produces, and as a proof that the Atlantic has been visited with Westerly gales, I beg to state that in latitude 42 and longitude 61, we overtook the "Sir James Kemp," out 58 days from Dundee. and in latitude 40 29, and longitude 68 18, we passed the "Hibernia" which vessel left Liverpool on the 17th of June, 18 days before the "Royal William." The undernamed Packets have not yet reached New York, and as their usual passages are much shorter than that they are now on, nothing can show more clearly the adverse weather in the Atlantic for vessels coming to the westward.

North America, left 16 June.
Roscoe, " 24 "
William C. Nye, " 26 "
Louisville, " 26 "

Total time of the Royal William between Liverpool and New York, 18 days and 23 hours.

	Days.	Hours.
Winds blew from N.W. to S.W.	11	11
N.W. to North	2	17
S.W. to South	2	0
Easterly	1	17
Calm	1	2
	18	23

Now as the course from Cape Clear to New York is about W. by N. it is evident the "Royal William" had to contend against eleven and a half days of *opposing* winds, that is to say, those blowing between S W. and N.W.; and as it frequently blew gales, I trust some credit will be given to a vessel which has opposed them so successfully. For the first eleven days she had no opportunity for setting her fore sail or fore top sail. As a proof of her capabilities for speed, it is only necessary to give the result of the last seven days she was at sea, during part of which time she had 56 hours of head-winds—

Noon ending 18 July,—206 miles,
19th " 240 "
20th " 182 "
21st " 179 "
22d " 230 "
23d " 239 "
24th 239 "

Total in seven days, 1,514 miles

The above are by *observations*—by dead reckoning she ran 257 miles on the 23d.

The "Royal William" is fitted up with water tight bulk heads,

which by dividing the hull into five compartments, renders it perfectly safe under almost any circumstances; certainly from collision or fire; this plan of dividing the vessel into sections, was originally adopted by Mr. C. W. Williams of Liverpool, to whom the public are indebted for so great a means of preservation to human life, and which has gained him in England the applause of the public at large. The "Royal William" belongs to the City of Dublin Company, established in 1824, to run steamers between Liverpool, Dublin and Belfast. They have a fleet of 17 vessels employed in the Irish channel, which make annually about 1000 voyages, and from the peculiar care used in their construction, and from almost daily inspection, not an accident has occurred to endanger life during a period of 14 years.

The experience acquired by the Managing Directors has led parties in the United Kingdom to solicit their assistance in the formation of a Company to run Steamers of a large class between Liverpool and New York; and in consequence of that assistance being afforded, progress has been made. Subscribers have come forward, and two vessels of 1,250 tons and 420 horse power each, are now in course of construction, to be followed by others as numerous as the wants of the station will ultimately require.

I am, Sir, your obedient servant,

JAS. C. SHAW, Marine Manager.

From the Army and Navy Chronicle.

English and American Steam Engines.—Steam Ship Great Western and U. S. Steamer Fulton.

MR. EDITOR: I have to ask the favor of your allowing me, through the medium of your columns, to reply to an article that lately appeared in the British and Foreign Review, on "Maritime Steam Projects," and at the same time to furnish some comparative data in relation to the steam ship Great Western and the U. S. steamer Fulton; the former acknowledged to be the *chef d'œuvre* of English manufacture, and the latter an *experiment* on the part of the Navy Department, to test the practicability of applying steam to vessels of war.

The article above alluded to, thus reads:

"The maritime steam projects now being carried on are grand enough to satisfy the most ardent mind for at least a quarter of a century to come. The Government [British] has determined to support the communication with the East by way of the Mediterranean, Cairo, Cossein, and the Red Sea. But no energy and devotedness, backed even by the wealth of the East, will, with the present machinery, which is behind the age, stem the opposing monsoons. It is, however, as we will show, to be accomplished. It is cruel, to exhaust the minds, the thews and sinews of such men as Chesney and Waghorn, and many more, by a pertinacious adherence to antiquated and imperfect systems, solemnly maintained by the assumptive cautiousness of pretended wisdom. The voyage to Alexandria may be *expensively* performed by boats of the common construction. The monsoons are to be met and overcome, the short head seas to be ploughed through, and the passage unerringly made by means of the high pressure steam only."

"The boats intended to attempt the passage to North America are nearly completed. They are about the tonnage of an eighty gun ship, and all that skill can do to render them worthy of the enterprise has been

done ; but the engines are low pressure, and occupy so much space, and are so heavy, that it may be doubted their being able to carry a sufficient supply of fuel, particularly if they were to be opposed by adverse gales. With fine and simple high pressure engines, and using distilled water, they would have performed the voyage easily. The same observations are applicable to the intended passage by steam round the Cape of Good Hope. High pressure engines and distilled water must be adopted, or it will fail."

To a person unacquainted with the objections to the English condensing engines, (low pressure) this mention of high pressure as the plan of engine, would not be construed in a manner at all flattering to the philosophy of the writer ; for, if he does not mean that the conventional unit of weight and velocity, termed horse power, is more powerful in a high than in a low pressure engine, it is a fair testimony of a tacit acknowledgment of the practical inefficiency of their condensing engines to propel a vessel against an undue resistance in the winds or currents, and to perform long voyages, in consequence of their immense weight and bulk; the former supported by lessening the space and impairing the qualities of the vessel as a " sea boat," and the latter accommodated at the expense of capacity for fuel and stores.

Now as one of the leading objects of this reply is to point out the inefficiency of English Engines when compared with those of this country, for the purposes of sea navigation, on account of their undue weight and consumption of fuel, the following acknowledgment on the part of their advocate, is very opportune for my purpose, as it is fair testimony of the absence of improvements of *their* present engine, over that of the inventor, Watt—

" The size and weight of the boilers make larger vessels necessary than are required for the duty they are intended to perform, and thus the first cost is considerably increased, and afterwards all the charges ; the quantity of merchandize proportioned to the tonnage cannot be stowed, and the extent of cabin room is curtailed. In bad weather the vast weight is so high, that the vessel rolls, and labors, and strains, and those evils are increased from the vessel being of light draught of water ; the dimensions and weight of the boilers and machinery prevent the stowage of fuel ; thus shortening the distance the vessel can go without a fresh supply. There are other minor evils, which it is unnecessary to dwell on here. It cannot be denied that able machinists have done, perhaps, nearly what can be accomplished with the low pressure engine of Watt, on which scarcely any great improvement has been made since it was first used. Proportion, strength of parts, properly adjusted, the condenser, and some details, are all that even his talents produced."

The *capability* of the writer to draw correct conclusions respecting the merits of American engines, together with his *impartiality* and tact at levelling unmerited abuse upon work as far superior to that of his country, as the following aspersions are devoid of an approximation to the truth, with the single, and to us creditable exception, that with our vessels, built exclusively for river navigation, the boilers "are chiefly on deck."

" Before we enter more minutely in this important branch, we must, in justice to our country, unequivocally state, that the declaration of the superiority of American steamboats is a mere delusion. One of the most competent judges informed us, after a minute inspection, that the steam-

boats on the North American rivers were in a deplorable condition; most of them with the balance beam of yore, made of wood, with the machinery of the coarsest workmanship, and boilers chiefly on deck, so imperfectly constructed as to be disgraceful to mechanics: their high pressure, the mere abortions of ignorant and reckless men."

But to return to the writer's assertion that high pressure engines only must be used. I would ask him if he is aware of the risk and expense of using high pressure boilers upon salt water, especially upon the Red Sea, the water of which is of greater specific gravity than even the ocean, and deposites a greater proportion of sediment, when submitted to the action of heat, and especially that degree requisite to afford steam of sufficient density to be classed as high pressure; and hence the necessity of having a double set of boilers for each engine, if the vessel is required to be kept in operation for a period of ten or twelve consecutive days; and consequently incurring nearly as great weight, and occupying a greater space, in boilers and furnaces, than with one set of boilers for a low pressure engine of equal power; and that, if to avoid the double set of boilers, "distillation" is resorted to, the engine is rendered a condensing one, unless an apparatus separate from the engines is used, which will occupy a greater space than the boilers, for the supply of which this apparatus is resorted to; to all of which objections, another, and by no means of the least importance must be added, which is the increased consumption of fuel per horse power, in a high pressure engine over a condensing engine, which fact the writer has certainly forgotten, for his great *practical* experience must have made him acquainted with it.

Again—

"Having condemned the present machinery of steamboats as obsolete, behind the age, and as reducing the profits and increasing the first expense, we deem it our duty boldly to state what we consider would be a great progressive step.

"Every steam ship should be built of iron, with compartments reaching above the water mark; with them she could not founder: being built of iron she could not burn.

"No steam ship should use salt water in her boilers; to do so is disgraceful to science. Distilled water only should be allowed to be used."

On this point all American engineers must, and do fully agree with the writer, and commend him for his candor, though they cannot for his consistency; for, of a certainty, English engines are not only obsolete (in this country) but are far behind the age. Many portions of the Great Western's engines are only known here by history, having long since been discarded as useless, in comparison with arrangements that have far superseded them, both in practical efficiency and mechanism.

In support of what has been advanced respecting the comparative merits and disadvantages of the engines of the two countries, I will give a detailed statement of the power, speed, and space occupied by the engines and boilers of the

GREAT WESTERN AND FULTON.

The former having engines (according to the American estimate of 44,000 lbs, with the ordinary pressure and revolutions, steam cut off at even one-half the stroke of the piston,) of 375 horses power,

Bucket surface in superficial feet	550
Speed of periphery of wheel, in miles per hour . . .	14½

Space occupied by boilers and engines in cubic feet			56,100
Weight of Engines		400 tons	
do.	boilers (iron)	88 do.	
do.	water in do.	100 do.—total	588

Consumption of fuel, according to the *very lowest* estimate given, one and a quarter tons of coal per hour, (the estimate given by the engineer was two tons.)

The Fulton has engines, at the ordinary pressure of 12lbs. and 21 revolutions, steam cut off at one quarter the stroke of the piston, of 460 horses power.

Bucket surface in superficial feet			552
Speed of periphery of wheel in miles per hour			17½
Space occupied by boilers and engines in cubic feet			26,622
Weight of engine		78 tons	
do.	boilers (copper)	88 do.	
do.	water in do.	41 do.—total	207

Consumption of fuel one and a quarter tons per hour.

Thus it appears that the Fulton with engines of 85 horses power greater than the Great Western's and with an excess of speed of wheel of two and two-thirds of a mile per hour, burns but the same quantity of fuel, at the minimum estimate of the latter, being a difference of one and four-tenths of a pound less per horse power per hour; and that the engines and boilers of the different vessels occupy space in the proportion of 27 to 56, one exceeding the other by a space in which 228½ cords of wood or 634 chaldrons of coal, could be stowed, and have a difference of weight of 381 tons; all of which advantages are in favor of the Fulton, which I trust will be taken as conclusive evidence in favor of the efficiency and superiority of American steam engines and boilers over those of English manufacture.

And if one of my age and pretensions might be allowed to advise, with these facts to support him, I would say to our transatlantic friends, first correct the unseemly apparatus and immense *water tanks* you term steam engines and boilers, and keep pace with the improvements of the age and British science in other branches, before you enter into ill-judged and unmerited comparisons, as well as schemes founded upon an impracticable basis.

To my countrymen, on this side of the Atlantic, learn that to indulge in encomiums upon the manufactures of other countries, at the expense of your own, is not always indicative of either a knowledge of the subject, or good sense, and that while America can boast of names that will still shine as conspicuous in the history of the steam engine as those of any other country; they should not suffer it to be said, that while history records the name of Fulton upon her brightest page genius mourns the ingratitude of his countrymen. A Young Engineer.

The following remarks are so entirely coincident with our own views on the subject, that they may replace an article we had prepared to the same effect.

We think, with Dr. Parkman, that the public in general have a much greater responsibility in the mattter than is commonly supposed. Im-

proper boats or machinery would not be used if an enlightened public refused to encourage them.

Moral Causes of Recent Disasters.

The following are extracts from a discourse delivered in the New North Church, in this city, by its Pastor, (Rev. Dr. Parkman,) on the Sunday immediately following the recept of the intelligence of the wreck of the Pulaski.

"You know not what shall be on the morrow"

My friends,—rather in such a connexion I should say—my fellow citizens, it is high time to awake out of this sleep. It is your solemn duty to inquire—'What is the *cause?*' or none of you may tell, what shall be the end of these things. And I appeal to your own reflection, if there be not the utmost reason to fear, that among the causes of these fearful calamities, immediate or remote, we must number—first a sordid avarice, seeking out *the cheap* to the rejection of what is solid; neglecting necessary, because, forsooth, expensive precaution; a rash confidence, presuming that what was safe to day shall be safe to-morrow; a passion for progress not less childish, than it is ruinous, providing even in the very construction of the vessel for speed rather than security; a spirit of competition as mad as it is mischievous, careless of life in its wild and unprincipled gratification; and then—and a most fruitful source of evil—the reposing of trust, where trust should never be reposed, with incompetent and reckless hands, with men that have no prudence, nor vigilance, nor self-control, and whose passions are their masters; and last—and worst of all Intemperance* that all-comprehensive, that all but omnipotent mischief, confounding all wisdom and making fruitless all caution—these, my brethren, and such as these, have been but too often the guilty causes of these heart-rending accidents.

Nor is it to proprietors or agents or commanders alone that the blame is to be ascribed.—Passengers, even for pleasure, hastening as for their lives, they scarcely know whither or for what, or intent on some scheme of business, or sudden speculation, that shall lift them out of the dust and set them with princes, will grow impatient of a delay that is wise, and urge on by entreaties and even bribes to a haste, that is ruin; countless examples of this childishness and insanity might be adduced.

Whence is it, fellow citizens, that in Great Britain and other parts of Europe, in seas also, where navigation is difficult and hazardous, we hear so seldom of these horrors. It is because men are willing to move not with the wings of the wind, or as the lightning, but with the progress appointed to men. It is because the government protects by its laws the lives and the property of the subject; and will not permit men's madness to be their ruin; nor an imaginary individual right to be exercised to the public wrong. It is because they make responsible with life or liberty, those who are entrusted with sacred interests, and punish carelessness and presumption, such as have been the causes of countless evils here, as crimes.

My brethren, it is not my practice, as you know—for I freely confess it accords not with my principles—to bring topics of doubtful moment to

* The dreadful wreck of the Rothsay Castle between Liverpool and Dublin, a few years since, in which more than a hundred perished, and among them many precious lives, was occasioned as was proved upon investigation, by the brutal intemperance of the captain.

these temples of God. Questions of political expediency, exciting the public mind—whatever may be urged by the earnest reformers of these days, of their moral bearings—I am perfectly willing to leave to the occasions and places where they properly belong. For myself, I prefer on this holy day to speak of the great things of God's law, and the glorious things of the gospel of peace, and to meet you, my people, in the love of God, and the grace of the Lord Jesus, and the sweet fellowship of an holy spirit. With the course of public justice, also—whether in its progress or its issue—more especially when it is for the terror of the evil doer, and the punishment of the transgressor—I have not deemed it my duty (nor can I entertain any notions either of civil or religious liberty requiring me,) either as a citizen or a religious teacher, to interfere.

But when precious lives are in danger, and sacred interests of domestic, social affection exposed; when from the love of money, that fruitful source of evil, and that hastening to be rich, which marks us as a people, and in its various and complicated influence pierces with so many sorrows;—when by negligence, hazardous as it is unpardonable, blind as it is audacious; by the want of skill and faithfulness, which may bring with it all the *horrors*, without the *intention* of murder;—when by an insane rivalry, which has no earthly object but the gratification of an absurd vanity, and which to its own folly superadds the mischief of exciting by a contagious sympathy the like folly, the like insanity in multitudes whose lives are perilled by it—when by these and such like causes human life is sacrificed, and the hopes of kindred, families, the nation and even of mankind are blasted, then does it become every minister and every citizen, as God may give him light and opportunity, to speak: and may the same God give you of his own blessing to hear. May the cry go up to his holy place. May we as a people be saved from our sins, that we may be saved from his judgment, lest that may be fulfilled concerning us, which is spoken—'Madness is in their hearts while they live, and after that they go to the dead.'

Minutes and Proceedings of the Institution of Civil Engineers, containing Abstracts of Papers, and of Conversation for the Sessions of 1837.

(Continued from page 100.)

May 2, 1837.

The President in the Chair.

The Ordnance Maps of England and Wales were received from the Master-General and Board of Ordnance, and the President announced that, by the munificence of Mrs. Chapman, the Institution was to be made the depository of all the professional plans and papers of the late William Chapman, of Newcastle.

Mr. Harrison presented a drawing of the Drops at South Shields, erected by himself, and gave an account of the method of working them.

Some remarks were made on the various methods which had been employed for representing the nature of a country as to levels and slopes. In one map of Warsaw the level of every point was shown; in the Ordnance maps of France the heights of most principal points above the level of the sea are noted. With respect to slopes, different degrees of shading might be used advantageously for mountain ground, the gentle inclinations being lightly and the steep places deeply shaded. In some Prussian

maps they had represented mountain ground by circular lines at assigned distances, the lines being very near for considerable slopes. An objection to this plan is, that an engraver aims at a degree of accuracy which he can rarely arrive at; he cannot easily possess sufficient data to put the lines all round a mountain with any tolerable degree of accuracy.

"On the Velocity of the Water in Belfast Harbour, by William Bald, Civil Engineer, F. R. S. E., M. R. I. A."

The Bay of Belfast, or Belfast Lough, is about eleven miles long by three broad, and has a depth of water varying from two to eight fathoms at low tide. The bottom consists of mud, and is an excellent holding ground. The mean of thirteen observations assigns the low-water line of spring tides, during the months of January and February last, at *two* feet above the sill of the gate of the new Graving Dock.

The waters of the river Lagan, fed by a basin whose area is 200 square miles, are discharged into Belfast Bay. The average quantity of rain annually is about 36 inches; assuming that *one-third* of this falls into the sea by the Lagan River, the quantity will be equal to *one foot* of depth over the whole basin. The mean daily quantity will be somewhat more than fifteen million cubic feet per day. This is the power combined with the tidal water to keep open the Channel of Belfast.

On a map accompanying this paper, are delineated the velocities of the ascending and descending currents at different states of the tide and parts of the channel.

Mr. Harrison gave, at the request of the President, some information respecting the fuel and fire boxes of the locomotives on the Stanhope and Tyne Railway. From long experience they found that coal, which contains much bitumen, causes the tubes of the fire-boxes to leak in a very short time. They obtained coal as free from sulphur as possible, and the consequences had been most advantageous; for during two years and a half not more than 120 tubes had been required for seven engines, of which four were always at work. The tubes were of copper, and 1¾ inch in diameter. The usual speed about ten miles an hour. One engine weighing ten tons on six wheels takes 128 tons of coal. The consumption of fuel is 2$\frac{1}{10}$ lbs. of coal per ton of goods per mile. The gross load is more than double the weight of the goods. The cheapness at which they carried was to be attributed to the low speed.

Mr. Carneghie, in reply to a question from the President, stated that the Stone Planing Machine had not answered for sharp sand stone; but by endeavouring to imitate the mason's tool, and making the machine work in the same manner as the mason, they had succeeded completely. This tool was a comb with teeth, and curiously enough he had found in Dresden a tool which had been in use from time immemorial exactly similar to that which they had adopted.

May 9, 1837.

The PRESIDENT in the Chair.

"On the application of Steam as a moving Power, considered especially with reference to the reported duties of the Cornish and other Engines. By G. H. Palmer, M. Inst. C. E."

In this paper Mr. Palmer first considers the maximum duty which can be done by atmospheric steam, and then, by reasoning analogically from certain theories, some of which are recognised as established, he infers that highly elastic steam, worked expansively, cannot be as economical as atmospheric steam. The reasoning by which the first question, namely, the amount of duty done, is treated, is as follows:—One bushel, that is 84 lbs. of coal, will convert 12 cubic feet of water into atmospheric steam, or each cubic foot of water is made to occupy 20,328 cubic feet. This may be applied directly to raise a column of water, say 35 feet high; that is, 84lbs. of coal will in the absence of all friction, be effective for raising 20,328 cubic feet of water 35 feet high; that is, 1,270,500 lbs. 35 feet high, or 44,573,375 one foot high. Making then the usual deduction of 4-10ths for friction, according to Tredgold's calculations, we have about 25,000,000 lbs. as the effective duty of the atmospheric steam produced by 84 lbs. of coal.

Mr. Palmer having ascertained the maximum duty of 84lbs. of coal, proceeds to infer that high pressure steam, worked expansively, must be less efficient than this; and the reasoning by which he arrives at this conclusion is founded on the following theories:—

1°. That the sum of the latent and sensible heat is a constant quantity.
2°. That all matter, steam of course included, evolves caloric on compression, and absorbs caloric on dilation.
3°. That equal quantities of water will always require equal quantities of fuel to convert it into atmospheric steam; but though equal weights of water must absorb equal increments of caloric when atmospheric steam is generated, it does not follow that all the caloric absorbed in high pressure steam is exclusively supplied by the fuel expended.
4°. That steam of two or more atmospheres elasticity does not contain two or more times the quantity of water contained in atmospheric steam, but contains proportionably as the pressure under which it is generated is increased.

"The preceding principles are illustrated, explained, and insisted on in great detail, and the author infers from them that the high pressure steam generated by one bushel of coal cannot, when worked expansively, perform more duty than atmospheric steam, unless, as is premised in the earlier part of the paper, more than 62½ lbs of water can be converted by 7 lbs. of coal from 40° Fahrenheit to atmospheric steam, and unless steam can dilate without converting sensible into latent caloric.

Novel Idea in Civil Engineering.—It is proposed in the Board of Assistant Aldermen, of this city, to leave the question as to the *high bridge* or *syphon*, for crossing the Harlaem River, to the decision of the *electors* at the polls.

We are not informed whether these worthy gentlemen are about to decide what kind of cement or stone shall be used, by the same appeal to the public.

Reading Railroad.—The Railroad between Reading and Norristown is completed, so that a complete line of communication between Philadelphia and Reading is now opened. The whole distance may be performed in less than four hours.

Good Examples, which should be universally followed for the good of the cause; and as we presume it is only necessary to mention them to insure imitation, we give the facts, withholding names, that others, *as well as ourselves*, may profit thereby.

We have recently, since the commencement of Vol. 7, received letters, or communications of congratulation on the reappearance of the Journal, from Chief Engineers of three important Railroads, in different parts of the Union, *each of which* contained the *advance* subscription for *five* or *six* subscribers, *mostly* new ones. If each Chief Engineer employed would *do likewise*, and each subscriber now indebted would pay up what he owes, we should be able to make the Journal more interesting, our creditors better satisfied, and ourselves better natured.

Progress of Internal Improvements.

We are always pleased to learn that there is competition and spirit amongst those who seek for contracts on public works; it encourages us to believe that the period is at hand when we shall again see operations resumed on all those works which have been suspended by the derangement of the currency, and many others commenced, which are essential to the convenience and prosperity of business.

The annexed notice of a "letting" on the "Central (Ga.) Railroad" is highly satisfactory—and we anticipate a speedy completion of this important work.

We shall give, in our next number, the first report of the Chief Engineer, L. O. Reynolds, Esq. The following notice is from the Savannah Georgian of 2d inst.

"*Central Railroad.*—Yesterday was the last day for receiving proposals for a further letting of this work.

"We are informed that contracts have been extended to a point 100 miles from the city—the distance put under contract yesterday being 21 miles.

"The contractors are all responsible men, and the prices rather below the estimate of the Engineer."

We also find the annexed notice of the "Western and Atlantic Company," in the Georgia Pioneer, printed at Cassville, Ga., and ask the attention of Contractors to the advertisement of Col. Long, the Engineer, in this number of the Journal.

"We invite the attention of the public to the notice in reference to the Western and Atlantic Railroad, given in this number of the Pioneer.

"We rejoice to witness the rapid advancement of this magnificent enterprise—but a little more than a year has elapsed since the commencement of the surveys. At this time all the surveys requisite, in order to

determine the most favorable localities for the road, from its southern terminus to the Tennessee line, have been made, and upwards of fifty miles of the road are now under contract, fifty miles more are again exposed for contracts, affording the unprecedented example of 100 miles of the same Railroad, offered for construction within six months from the date of commencing the work.

"The energy and despatch evinced by all engaged in this great enterprise are truly commendable; and no doubt can exist, that the plaudits of every patriotic citizen of Georgia, will be awarded to the Commissioners of the Railroad, for their zeal and efficiency in hastening forward its construction with such an unexampled speed.

"The times appear unusually auspicious for the vigorous prosecution of the work. The means available under the patronage of the State, are ample; the crops of the season already gathered, as well as those now ripening for harvest, were never more abundant and promising; and we are highly gratified to find a spirit and disposition on the part of those to whom the management of the Railroad has been entrusted, every way correspondent to the state of the times just adverted to."

Georgia Railroad.

We are indebted to a scientific friend for the following particulars of an important link in the great chain of Internal Improvement:–"This important work, but little known beyond the limits of Georgia, is destined to effect great changes in the direction of the channel of transportation between the Atlantic and some of the Western States. Those who are curious about such matters may trace its course on the map of the United States, by a line starting from Augusta and terminating at Tennessee river, a few miles above Rossville; passing through Crawfordville, Greensboro', Madison, Covington, Decatur and Marietta. The length of the road will be 280 miles, and throughout its whole extent, it is remarkable for its entire freedom from Inclined Planes, requiring stationary power for its easy grades and curves—at no point does the rise exceed 35 feet per mile. Between Augusta and the Atlantic, there is (in operation) an excellent Railroad to Charleston, and as fine a river for steamboat navigation as the Mississippi itself to Savannah. At the other end of the road, there is a river navigable for steamboats up to Knoxville; and a Railroad is being built to the same place, which will leave the Georgia Railroad near the State line. The Tennessee river below the termination is navigable for steamboats to the Mississippi, with the single exception at the Muscle Shoals, around which there is now in operation a Railroad on the south side of the river, and a canal is in progress of completion on the north side.

By the Georgia Railroad, merchandize may be delivered from Philadelphia or New York on the Tennessee river at $1 to $1 20 per 100 lbs. in the space of 6 to 10 days.

That portion of the work between Augusta and Decatur, is to be constructed by the Georgia Railroad and Banking Company. Sixty-five miles of it is now finished, and 83 miles reaching to Greensboro' will be completed in December—the balance as early as possible.

Beyond Decatur the work has been undertaken by the State of Georgia, and it is progressing with great rapidity—upwards of 50 miles of it is now under contract, and every arrangement has been made to complete the whole line by 1841.

In connexion with the Georgia Rail-road, there is a branch railroad (to convey the travel between the North and South,) to diverge at Covington and run to West Point, there intersecting the Railroad from thence to Montgomery, now being constructed. Thus completing an entire chain of Railroad and Steamboat communication between New Orleans and the North. View the Georgia Railroad in all its bearings, it will be considered the most important improvement now in progress." —*U. S. Gnzette.*

Central (Ga) Railroad.—We find in the Savannah Georgian, of July 28th, the following notice of this Road:—

"The road bed is graded to the extent of 72 miles. The rails are laid 35 miles, the cars running that distance, and the Macon mail and passengers are now carried 30 miles on the road. This shortens the time between this city and Macon about 4 hours; a connexion with the stage line will be made in a few days, 10 miles further up. The contractor for laying superstructure is pushing on with a heavy force at the rate of about 1½ mile per week.

"The grading is under contract to a point 79 miles from this city, and on Wednesday of next week, contracts will be extended to 100 miles, and the road will be graded that distance by the 1st of January next.

"The force on the line is now about 400 men. Two parties of Engineers are actively engaged in defining the line from Ogechee onward, and the result of their surveys shews a more favorable route than was originally calculated on.

"The inhabitants of Burke county are awakening to the importance of a connexion by means of a branch between our road and Augusta, *via* Waynesborough—and if we may be permitted to express an opinion on this subject, we have no hesitation in saying that no Railroad project in the State offers a fairer promise of profit than this branch. A public meeting is called at Waynesborough, on the first Monday in August, to deliberate on the subject. We say, 'God speed them in the good work.'"

Liberal and successful Legislation.—The annexed communication, signed X, is from the Boston Daily Advertiser; it shows what may be effected by liberal, yet judicious legislation.

"*Western Railroad.*—We understand that the Stock created at the last session, so far as it has reached London, has been sold at 3 and 4 per cent. advance, principally at 4 per cent. advance. This, added to the premium of the Exchange on London, will make an aggregate of 11 per cent.; which (agreeably to the provisions of the Act,) are to constitute a Sinking Fund and to be paid as such, into the hands of the Treasurer of the Commonwealth.

"This Sinking Fund, augmented every year, by its accruing interest and by 1 per cent. on the whole loan of $2,100,000, to be paid annually, by the Western Railroad, to the Treasurer of the Commonwealth, *will be more than sufficient to pay off the whole amount of the loan*, by the time it becomes due.

"Thus will the Legislature of Massachusetts of 1838, have caused the Western Railroad to be built, in the shortest possible time;—have occupied usefully, a great mass of idle labor; and have created, by their

skill, a great proportion of the funds to accomplish this great enterprise; and have done all this without any expense or risk to the State.

"Thus, also, will they have contributed their share to the great mass of State Stocks, which (created by various States, for Internal Improvements,) has so usefully aided each and all of them, to obtain tangible funds, for the resumption of specie payments.

"In the history of that most important instrument for the happiness of man, (Internal Improvement) the Legislature of Massachusetts, for 1838, will hold a distinguished place, as having given life to a measure calculated to do immense good, in its present and in its future consequences—both in peace and war—without cost of blood or treasure; and as having revived the benumbed energies of the great State of Massachusetts, and penetrated, for the benefit of the present and future generations, the very heart of the fertile and immense valley of the Mississippi. X."

Railroad Contracts.—We understand, says the Columbia (S. C.) Telescope of the 21st inst. that on the recent visit to this place of the President and chief engineer of the Louisville, Cincinnati and Charleston Railroad Company, they succeeded in making contracts for the construction of the remaining portions of the road from Columbia to Charleston, extending from McCord's Ferry, on the Congaree, to Branchville, a distance of about 40 miles, at rates at or below the estimates of the engineers. When the first contracts were offered on this road, there was very little competition and few bidders. But with the progress of the work, has sprung up a spirit, which promises to carry it through with a becoming zeal and energy. Our planters are coming forward and taking contracts on the most satisfactory terms. It has been demonstrated that our slaves are well calculated for this description of work—furnishing a species of labor which can be advantageously employed at all seasons of the year, and to any amount the wants of the company may require. We congratulate the country upon the cheering prospects and bright hopes which this great work continues to hold out to the people of the Southern and Western States—hopes which we trust are destined to be fully realized.

Our Great Railroad.—At a meeting of a number of the Stockholders in the Cincinnati and Charleston Railroad, at this place on Friday last, (says the Knoxville Register, of the 11th inst.) resolutions were unanimously adopted requesting the Directors from this State to make immediate application to the President, for a corps of Engineers, to make a final survey of the route between this place and the North Carolina line, preparatory to its definite location, and putting under contract; and also requesting the location of a branch of the South Western Bank at this place, at as early a day as practicable. The meeting then adjourned to meet again at this place on the first Tuesday, 7th day of August next. The object of this adjourned meeting is that the Stockholders in Tennessee may deliberate and instruct their Directors upon an early commencement of the work in Tennessee. A general meeting of the Directors takes place in September, and if our local Directors request it, immediate steps will be taken to commence the construction of the Road in Tennessee. This is an important question, and we trust our Stockholders will generally attend the meeting in August.—*Ch. Patriot.*

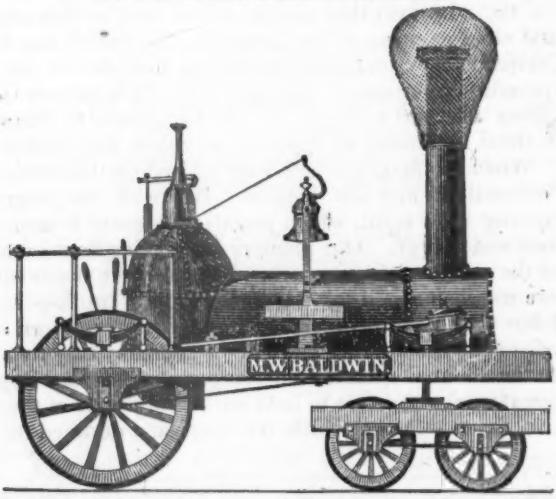
"*Railroad Bridge Burnt.*—The bridge on the Schenectady and Utica Railroad, four or five miles east of Fonda, was burnt on Friday night last, in consequence of which the train of Saturday morning was delayed. It was supposed to be the result of villainy."

It is hardly to be anticipated that a system, which affords so much benefit to the community, can escape the malice of *envy* and *ignorance.*

Locomotive Steam Engines.

We would call the attention of such of our readers as are interested in Railroads, to the communication of Mr. W. Baldwin, of Philadelphia, the most extensive manufacturer of Locomotive Engines in the country.

By a reference to the testimonials annexed to his card, it will be seen that they are *official certificates* of the every day performance of his Engines *for years*, and not a description of a single performance.



M. W. Baldwin, ***Manufacturer of Locomotive Steam Engines, Stationery Engines, Steamboat Engines, Railroad Machinery, Sugar Mills, &c. &c., Broad Street, Philadelphia.***

References to the following Companies, where the annexed Nos. of his Engines are in use:

	Nos. of Engines.	
Columbia and Philadelphia State Road,		24
Harrisburgh and Lancaster	Pa.	6
Little Schuylkill,	"	2
Cumberland Valley,	"	1
Philadelphia and Reading,	"	1
Phila., Germantown, and Norristown,	"	4
Boston and Providence,	Mass.	3
Boston and Worcester,	"	2
Utica and Schenectady,	N. Y.	12
Rensselaer and Saratoga,	"	2
Long Island,	"	2
Rochester and Tonawanda,	"	2
Clinton and Port Hudson,	Lou.	2
Island of Cuba,		2
Madison and Indianapolis,	Ind.	1
N. Cross Road,	Illinois	1
		67

	Nos. of Engines.	
Philadelphia and Trenton,	N. J.	4
New-Jersey Transportation Co.	"	5
Morris and Essex,	"	1
Philadelphia, Wilmington and Baltimore,		4
Charleston and Hamburg,	S. C.	4
Central Road, Savannah,	Geo.	2
Augusta Railroad,	"	6
Monroe Railroad,	"	1
Commercial Railroad, Vicksburg,	Miss.	2
West Feliciana,	"	1
Mobile and Cedar Point,	Ale.	1
Tuscumbia and Decatur,	"	1
Detroit and Ypsilanti,	Mich.	2
Adrian and Toledo,	"	2
Lake Wimico and St. Joseph's	Florida.	2
		38

From the annexed testimonials, it will be seen that the Engines of M. W. B., are not inferior in capacity of performance to any Engines in this, or any other country; while at the same time they combine several improvements secured by patent, and many advantages not to be found in other Engines.

One very important advantage is, the simplicity of their construction and arrangement, by which every part of the machinery is perfectly accessible while the engine stands upon the road.

The improvement in the construction of the cranks is one of *great importance*, obviating the liability to break,—an occurrence so common to most locomotive engines.

Another great advantage arises from having the fire-box before the driving wheels, thus making an equal distribution of weight, which wholly corrects the galloping or undulating motion peculiar to both 4 and 6 wheel engines, with the fire-box behind the driving shaft, making them more easy upon the road than any engines of the same capacity now in use; while, by the very simple device of throwing a portion of the weight of the tender upon the driving wheels, or detaching it at pleasure, the engine is made to possess the advantage of a light, with the adhesion of a heavy engine upon the ascents where increased adhesion is required.

In order to test their comparative merits, when used on the same roads with other engines, he suggests that a regular account be kept, of expenses of repairs, distance travelled, and work performed by each engine; which will furnish the only correct data by which to judge of their respective merits, which cannot be correctly done by a few experiments made for the purpose of effect.

M. W. B. manufactures three classes of Engines, Nos. 1, 2, and 3. Most of the above engines belong to the 3d, or smaller class, and many of them have been in use from two to four years. His present engines are very much improved. One of the first class, recently built, has drawn over the Columbia road, part of which has an ascending grade of 45 feet per mile, 35 loaded cars weighing 187 tons, equal to about 700 tons on a level.

Orders for engines or machinery promptly executed, on application to M. W. BALDWIN, Philadelphia, or to E. L. MILLER, his agent, for contracts in the city of New York.

The following testimonials of the merits of these engines, have been received from Officers, Engineers, and Superintendents of motive power, &c. &c. of several of the roads above referred to.

Mr. JOHN BRANDT, Superintendent of Engines and Machinery, on the Columbia and Philadelphia Railroad, writes under date of the 11th of May, 1338:—"We have twenty-four of your engines, several of which have been in use since the fall of 1834. Two of your 3d class engines commenced running Feb. 22d, 1837, and travelled 55,625 miles, up to the 1st of May, 1838, and cost for repairs during the above-mentioned time, one cent and eight mills per mile. Eight engines of the first class, have travelled from the 1st of January, 1838, to the 1st of May, (4 months) 46,569 miles, made 653 trips, drawing 16,836 cars; the cost per mile for these four months, I am now unable to show, as our books are not posted, but can assure you that the expenses this year will be less per mile than any former years. One of the first class recently built, has drawn over the Columbia road, part of which has an ascending grade of 45 feet per mile, 35 loaded cars, weighing 187 tons, equal to about 700 tons on a level, and travelled from 8 to 12 miles per hour, except on the wooden track. This is the heaviest train that has ever passed over the road."

JAMES T. SHIPMAN, Resident Engineer of the Long Island Railroad Company, writes May 21st, 1838: "We have two engines of class No. 3, of your manufacture, which have been in use since May, 1836. Their performance is worthy of the most unqualified praise. We carry as an ordinary load, 15 freight cars, weighing 5½ tons each; and to show their efficiency, we have frequently taken 20 cars without difficulty, up an ascent of 35 feet to the mile; and have carried 4 cars up a grade of 211 feet per mile for a distance of 2,100 feet. The average speed for freight is 10 miles, and for passengers, from 20 to 25 miles per

hour. In the summer of 1837, they performed the distance of 162 miles each day, and from the journal which now lies before me, it appears that under this severe usage, there was no failure in either of these engines for 6 months, which rendered a change in their usual time of running necessary, or caused any delay, either in the transportation of passengers or freight. I am fully satisfied that the cost of repairs does not exceed one half that of a four wheel engine doing the same work."

Mr. JOHN CASH, superintendent of motive power, on the Norristown Railroad, says under date of May, 1838: "I take great pleasure in bearing testimony to the excellence of your engines They are well adapted to light or heavy loads. With one of the small class which has been nearly three years in constant service, I have drawn a train of 750 passengers, over grades of 32 feet per mile, at the rate of 14 miles per hour."

Mr. J. ELLIOT, Superintendent of Motive power, on the Philadelphia, Wilmington, and Baltimore Railroad, writes: "After an experience of several years with Locomotive engines on different roads, I am of opinion that the engines of M. W. Baldwin, are easier upon the road than any engines in use, and that they combine more advantages than any locomotives within my knowledge. They have been almost constantly running for the last eighteen months. The engine Brandywine, has been running 265 days, at a cost for repairs of $65 17, and has lost but 5 days since she was put on the road. The Christiana has been running 135 days at a cost of but $20 for repairs. Their average speed is 24 miles per hour, including stoppages."

L. G. CANNON, President, and L. R. SARGENT, superintendent of the Rensselaer and Saratoga Railroad Company, say under date of 29th of May, 1838: "We have two of your locomotives which have been in use about three years. They *work well* in every particular; and I deem it but an act of justice to say that the manufacture and materials of each have proved to be of the highest order, and I have evidence from the official reports of other companies, and my own experience here, that your engines will, in *performance* and *cost of repairs*, bear comparison with any engines made in this, or any other country."

W. W. WOOLSEY, Esq. President of the Boston and Providence Railroad Company, writes on the 31st of May, 1838: "We have three of your Engines, which have been in use since about June, 1836. We have never had occasion to put them to their maximum capacity. They have carried 17 freight cars of gross weight, say 85 tons, engine and tender not included, over the road at an average speed of 10 miles per hour, including an ascent of 5 miles in length, one half mile of which is 42½ feet per mile, and the remaining four and a half miles. 37½ feet per mile. They carry ten passenger, and three baggage cars, *very easily* over the road, at an average speed of 18 or 20 miles per hour. Your engines give *entire satisfaction*."

From WM. C. YOUNG, Superintendent and Engineer of the Utica and Schenectady Railroad, May 22d, 1838: "The twelve locomotive engines procured of you for the Utica and Schenectady Railroad have answered their purposes effectively. Notwithstanding much has been said about inprovements in such machines, I have not been able to satisfy myself that ours are wanting in any particular."

J. EDGAR THOMPSON, Chief Engineer, and General Agent of the Georgia R. R. & B. Co. writes July, 1838: "We have in operation on the Georgia Railroad, six locomotives from Mr. Baldwin's factory, all of which have given us entire satisfaction. The simplicity of their construction, and the excellent proportions and arrangement of the various parts of the machinery, entitle them in my opinion, to a decided preference over any other engines that I have examined, either of European, or domestic manufacture."

H. R. CAMPBELL, Esq. Civil Engineer of Philadelphia, writes: "One of your third class Engines (the West Chester) this morning, (June 8th) drew a train of *fifty-one* loaded cars, from Schuylkill Bridge to Broad-street, (4 miles) passing several abrupt caves, some of 757 feet radius, and several ascending grades, one of which is 32 feet per mile. The weight which I got from the weighmaster of the road, for my own satisfaction, was 284½ tons exclusive of the Engine. It exceeds any experiment I ever heard of in any part of the world, and was apparently made without any preparation, for no one was present to witness it, but the hands on the road and myself, who was casually passing."

" L. A. SYKES, Esq, Superintending Engineer of the New-Jersey Railroad, says under date of June 12th, 1838: "We have five of Mr. Baldwin's third class Engines on our road, which have been in use from one to two and a half years, and have performed to our entire satisfaction. Our first Engine was put upon the road in December, 1835; it has been in constant use with the exception of a very few days; is now in perfect order, and apparently as good as ever. In simplicity of construction, small liability to get out of order, economy of repairs, and ease to the road, I fully believe that Mr. Baldwin's Engines stand unrivalled. I consider the simplicity of the Engine, the arrangement of the working parts, and the distribution of the weight, far superior to any thing I have ever seen, either of American or English manufacture, and I have now no hesitation in saying, that Baldwin's Engines will do the same amount of work, with much less repairs, either to the Engine *or the track*, than any other engines now in use."

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N.Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

PATENT AGENCY OFFICE AT WASHINGTON.

WILLIAM P. ELLIOTT, Artist, for many years employed in the *Patent Office*, will devote a portion of his time to the preparation of papers and drawings for applicants for Patents, and attend to the procuring of patents for useful inventions without the necessity of a journey to Washington; and will give information by *mail*, as to the originality of the same, previous to applying for patents.

All communications must be free of postage. His Office is in room No. 10. Patent Office Buildings, Washington, D. C.

Washington, April 20, 1838. Jyl—8t

NOTICE.—*To all whom it may concern.*

The undersigned gives notice that he has invented a useful improvement in the construction of Railroad Car wheels, which has been tried for several months on the Beaver Meadow Railroad. The undersigned was preparing to take out a patent of the same, when a certain Henry Moore, who had been instructed by the undersigned and employed for some time in casting said wheels, surreptitiously made a casting from his model and secretly despatched a messenger to Washington to obtain a patent for himself, which the undersigned is informed the said Moore has done, and is offering rights for sale Now this is to notify all persons to beware of purchasing rights under said patent, as the claim of said Moore will be earnestly contested before the proper tribunals of justice.

HOPKIN THOMAS.

Beaver Meadow, March 26, 1838. Jyl.—3t

PATENT SAFETY FUSE,

For Igniting the Charge in Blasting Rocks, both in dry places and under water.

To those acquainted with and accustomed to using the Fuse, comment or description is unnecessary; to those who are not, we would simply observe, that it is an important invention to persons employed or concerned in Blasting, as by its use that hitherto dangerous operation is rendered as *safe* as the ordinary employments of the Farmer. It insures certainty, and effects an explosion as well under water as in the driest situation, adds much to the *force* of the blast, and by rendering the priming needle unnecessary, saves much time.

Numerous certificates from those who have tested the Fuse, might be given, but the following is deemed sufficient.

CERTIFICATE.

Having seen the Patent Safety Fuse for Blasting tested to our satisfaction, we cheerfully certify, that we are convinced that it saves much time and labor ---adds to the force of the blast—ensures certainty, and renders blasting perfectly safe. Besides, it is we think, CHEAPER than the common straw Fuse. For dry blasting it is a great improvement; but for blasting in wet ground, it is invaluable. Messrs. F. Hitchins & Co., contractors on the Erie canal, certify that they have been engaged in the Cornish mines, England, where the Fuse is exclusively used, and that it has never to their knowledge, caused a miscarriage. They confirm our above expressed opinion of its value. We make no doubt that it will soon be in universal use in blasting operations.

DAVID HAMILTON,
Superintendent repairs, Erie Canal.
W. J. Mc ALPINE,
Assistant Engineer Erie Canal Enlargement.
J. HOUGHTON,
Engineer Cohoes Company.

COHOES, December 16, 1837.

The Fuse is manufactured by Baron, Bickford, Eales and Co. at Simsbury, Hartford Co., Conn., orders directed to them, or either of their agents, will be promptly attended to.

Agents for selling the Patent Safety Fuse.

David Watkinson & Co., Hartford, Conn.

A. G. Hazard & Co., 135 Front-st., N. Y.

Erastus Corning & Co., 361 South Market-street, Albrny. N. Y.

E. F. & A. G. Smith, 29 Exchange-street, Rochester, N. Y.

H. Kingman & Co., Buffalo. N. Y.

Curtis & Hand, 16 Commerce-street Philadelphia, Penn.

Pratt & Keith, South Charles-street, Baltimore. MD.

G. R. Peake, Richmond. Va.

W. B. Peake. Fredericksburgh. Va.

SHEET LEAD, &c.

THE Subscribers, Manufacturers of Sheet Lead, Lead Pipe, Red Lead and Litharge—have always an assortment in store, and for sale, at 175 Front Street, corner of Burling Slip.

CORNELL & TUCKER.

☞ Sheet Lead and Lead Pipe for Fortifications and Engineering, Milled any thickness and size to order.

New-York, March 10, 1838. 3t.

RAILWAY IRON, LOCOMOTIVES, &c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars; with countersunk holes and mitred joints, lbs

350 tons 2by, 15 ft in length, weighing 4 $\frac{6.8}{1.0.0}$ per

280 " 2 " $\frac{1}{2}$, " " " 3 $\frac{5.0}{1.0.0}$ "

70 " $1\frac{1}{4}$ " $\frac{1}{2}$, " " " $2\frac{1}{2}$ "

80 " $1\frac{1}{4}$ " $\frac{1}{4}$, " " " 1 $\frac{2.5}{1.0.0}$ "

90 " 1 " $\frac{1}{2}$ " " " $\frac{7}{8}$ "

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{2}$, $2\frac{2}{3}$, 3, $3\frac{1}{3}$, $3\frac{1}{4}$, $3\frac{1}{2}$, and $3\frac{3}{4}$ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope, for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTON & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.

NEW YORK, February 12th, 1836. 4—ytf

FRAME BRIDGES AGAIN.

The subscriber will build Frame Bridges in any part of the United States, Maryland not excepted, and will extend them to as long a span, and warrant them to be as strong, durable, and cheap as those made by any other method.

Having no patent right, he requires no agents. A large number of bridges of his construction are to be seen. Young gentlemen, who wish, can be instructed in the true mathematical principles of building bridges, and the application of the same to practice. JOHN JOHNSON.

Burlington, Vt., Jan. 1838.

MACHINE WORKS OF ROGERS KETCHUM AND GROSVENOR, Paterson New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. The works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY.

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Calenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR,
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.
Rochester, Jan. 19th, 1838. 4—y

PRESERVATION OF TIMBER.

THE PROPRIETORS of the invention of the late Robert Bill, of London, by which Wood may be saturated throughout with a Composition which has been found an efficient preservative against ordinary decay, the dry rot, and the gribble worm, having made such improvements thereon as have rendered the process more simple and efficient, are prepared to enter into contracts for the preparation of timber, and to dispose of the right of using the patent process.

The method in question is believed to afford a complete protection to wood, even in the most exposed and disadvantageous positions, at a less cost than any other which has yet been proposed. It is applicable to every case in which timber is employed: and is particularly worthy of attention in the blocks with which streets are paved, the rails and sleepers of railroads, the frames and planking of the gates of canal locks, the timber used in building docks and wharves, when the ravages of the worm are to be feared, and the piles and the beams used in every species of hydraulic construction. The details of the process may be learned, and terms made known, on application to

JAMES TREAT,
General Agent of the Proprietors,
No. 4, Wall st. New York.

Certificates.

I have witnessed a number of the experimental operations, made for the purpose of testing the practicability of Robert Bill's process for the preservation of timber. In these it was shown, that by the addition of improvements to the original method, the perfect seasoning of timber, by the separation both of its sap and uncombined moisture, could be effected: that almost every description of wood on which experiment was made, was thoroughly saturated with the protecting material; and that in the single instance, (hemlock,) through whose pores the injection was not complete, enough was done to exclude all access of moisture. The proprietors have certificates of the exposure of wood, prepared by Bill's method, to the most severe trials, for a space of five years; but were not this proof in their possession, it would be clear, from the high antiseptic properties of the material they employ, that wood, fully saturated with it, cannot be subject to any of the ordinary causes of decay. The power of the same material to repel the gribble worm is universally admitted, even when merely applied as a coating; but when injected throughout, it must act as a perfect protection.

Columbia College, N. Y. May 25, 1838.

JAMES RENWICK, LL.D.
Professor of Natural and Experimental Philosophy and Chemistry.

Certificate given by the British Government to Robert Bill.

"Timber prepared by Mr. Robert Bill was put into the dry rot pit in his Majesty's yard, Woolwich, where it remained for five years, and perfectly withstood the fungus rot, whilst numerous other specimens were destroyed in a fifth part of that time. Other pieces were placed in the sea, by the master shipwright at Sheerness; and while wood, considered impervious to the gribble worm, was nearly eaten up, these remained untouched. Some specimens of timber, so prepared were placed in the earth at his Majesty's yard, Deptford one half their length being buried, and the other half protruding above ground, and pieces cut from the same tree, but unprepared, were put in competition with them; at the end of five years the former remained unchanged, the latter entirely destroyed. These experiments prove that the inferior sorts of timber may be made, at a small expense, far more durable than oak, or perhaps any known wood, from which great national benefits may be derived.

JOHN KNOWLES,
Secretary of the Navy Board.

GENEVA, N. Y. 15th June, 1838.

Having seen several specimens of Wood saturated with Coal Tar (so called,) and believing its use would greatly tend to the preservation from decay of all exposed timber, in structures for Railroads, Bridges or Canals, I recommend its adoption, and believe said wood would prove to be one of the greatest elements of economy that has ever been introduced into works where timber forms a chief material.

J. G. SWIFT,
Late of the U. S. Army

PATENT HAMMERED RAILROAD, SHIP, AND BOAT SPIKES.

The Albany Iron and Nail Works, have always on hand, of their own manufacture, a large assortment of Rail Road, Ship and Boat Spikes, from 2 to 12 inches in length, and of any form of head. From the excellence of the material always used in their manufacture, and their very general use for Railroads and other purposes in this country, the manufacturers have no hesitation in warranting them fully equal to the best Spikes in market, both as to quality and appearance.

All orders addressed to the subscriber at the works, will be promptly executed.

JNO. F. WINSLOW, Ag't,
Albany Iron and Nail Works.

The above Spikes may be had at Factory prices of Erastus Corning, & Co., Albany; Hart & Merritt, New York; Jas. H. Whitney, do.; E. J. Etting, Philadelphia; Wm. E. Coffin & Co. Boston. 3ly

TO SUBSCRIBERS.

In consequence of the suspension, for several months, of its publication, the present, or *Seventh* volume, will be commenced on the 1st of July—*instead* of January, 1838: and the work will hereafter form *two* volumes each year.

*** The MECHANICS' MAGAZINE, heretofore published as a separate work, will from this date be united with the Railroad Journal, and the publication will hereafter bear the title of *Railroad Journal and Mechanics' Magazine*, and be forwarded to those who have paid for the *Mechanics' Magazine* to a period subsequent to *July* 2 1837, until they shall have received as many months of *this* as they paid for *that* work—or until otherwise ordered, if paid for in advance.

The terms are Five Dollars per annum, *in advance.*

To Engineers, Directors and Contractors.—The Editors of the *Journal and Magazine* are particularly desirous to receive information in relation to the *present condition* of each *Railroad* and *Canal* in the Union; as well of those in *use*, as of those in course of construction; and they respectfully request gentlemen in possession of, to communicate at an early period, the desired information.

A List of Subscribers who have paid since 1*st of July, the date of our last list:*

	Residence.	Paid to.
A. H. St. John,	Ithaca, N. Y.	July 1, 1839
B. A. Alderson,	Natchez, Miss.	Jany 1, 1839
Lt. T. S. Brown,	Dunkirk, N. Y.	Feb. 24, 1839
R. H. Fauntleroy,	Cincinnati, O.	July 1, 1839
Clark Williams,	" "	July 1, 1839
Col. Kearney,	Washington, D. C.	July 1, 1839
E. L. Lukens,	Tarrytown, N. Y.	Jany 1, 1839
A. C. Twining,	New-Haven, Ct.	July 1, 1839
Wm. H. Talcott,	Cuba, N. Y.	July 1, 1839
Geo. Vandenhoof,	Paterson, N. J.	July 1, 1839
E. Cutter,	New-York,	Jany. 1, 1839
S. A. Ellis,	Haysville, N. C.	March 1, 1839
G. S. Greene,	Warwick, R. I.	July 1, 1839
H. F. Flansberg,	Schenectady,	Jany. 1, 1839
J. S. Stoddard,	Brooklyn, L. I.	July 1, 1839
John P. Cumming,	New-York,	July 1, 1839
Williams & Purdy,	Waterloo, N. Y.	Jany 1, 1839
L. Walden,	West Stockbridge, Mass.	July 1, 1839
John Greigg,	Canandaigua,	July 1, 1839
Jonathan Leslie,	Richmond Va.	Jany. 1, 1839
R. Higham,	Canandaigua,	July 1, 1839
Simon Traver,	Rochester,	July 1, 1839
James Miller,	Canandaigua,	July 1, 1839
A. C. Powell,	Geneva,	July 1, 1839
R. C. Benedict,	Seneca Falls,	July 1, 1839
E. P. Williams,	Utica,	July 1, 1839
R. B. Mason,	Bridgeport, Ct.	July 1, 1839
E. J. Farnum,	Bath, N. Y.	July 1, 1839
T. L. Ogden,	Columbia, Va.	Jany 1, 1838
Wm. Lehman,	Lebanon, Pa.	July 1, 1839
Wm. Parker,	Boston,	Jany 1, 1840
James Barnes,	Worcester,	July 1, 1839
J. M. Fessenden,	Boston,	July 1, 1839
Samuel Nott,	Lynn,	July 1, 1839
Henry Wilder,	Boston,	July 1, 1839
Samuel Ashburner,	Salem,	July 1, 1839
Stephen A. Chase,	"	July 1, 1839
E. Tredwell,	New-York,	July 1, 1839
L. O. Reynolds,	Savannah, Ga.	July 1, 1839
T. Stanley,	"	July 1, 1839
H. A. Dodge,	"	July 1, 1839
F. E. Nicoll,	"	July 1, 1839
F. Doyle,	"	July 1, 1839
D. Morton,	Elsbridge, N. Y.	July 1, 1838
E. B. Hunt,	Lawrenceburgh, In.	Sept. 30, 1837
C. Campbell,	Richmond, Va.	Jany 1, 1839
W. B. Scates,	Shawneetown, Ill.	July 1, 1839